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ROLE OF THE COMMUNITY HOSPITAL IN CONTINUING EDUCATION—THE HUNTERDON EXPERIMENT

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• *For postgraduate medical education to be most effective, especially for the rural practitioner, it should be continuous and should be carried out in relation to individual patients in the community hospital. The community hospital must become an educational institution, with the local practitioner as a participant in an interchange of ideas between himself and the specialist. In one area, relatively devoid of industry, there has been a translation of the atmosphere and techniques of a university teaching hospital to a community rural medical center. This approach to continuing education should be translatable to other communities.*

The ideal of lifelong, continuing professional education has been axiomatic for the worthy physician in every age. Indeed, this is a moral and social responsibility that flows necessarily from the firm relationship that exists between the quality of medical care and the level of education of the physician. It applies with equal force to the teacher and the investigator and, perhaps with the greatest urgency, to the practicing clinician.

In the past 50 years, the range of knowledge in the sciences pertinent to medicine has been expanding at an exponential rate with the result that the realization of this ideal has become an enormous task even for the academic physician and the specialist. For the general practitioner, the problem is complicated by the exigencies of patient care as well as by the obvious restrictions imposed by time and by the limitations of the human intellect.

Physicians who do not have a direct relationship with a medical school or a university teaching hospital supply the greatest proportion of medical care in the United States today. Most of these men are general practitioners, and there is every indication that some type of general or family physician will continue to fulfill the medical needs of rural and semirural regions in the foreseeable future. Some method must be devised whereby this group of physicians may be enabled to improve their skills for the better service of the community and to experience the intellectual stimulation necessary for the continual acquisition of knowledge and understanding of recent advances.

The ever widening horizons of medical information and the changing role of the physician in modern society have produced such demands at the earlier levels of medical education that more of the detailed and specialized knowledge of medical practice must now be obtained in the postgraduate years.

Medical educators have been acutely aware of these problems, and a number of partially effective solutions have been devised. Postgraduate courses, seminars, symposiums, residencies, and scientific meetings have all been multiplied in recent years with the end in view of continuing the physician's education. These methods are reasonable and useful, but they are limited since they are elective and temporary stimulants intermittently applied and are attended by only a small percentage of practicing physicians. Rural practitioners often cannot leave their communities deprived of medical care for a long enough time to attend. These more or less formal methods are essentially didactic and, therefore, result in a passive rather than an active educational process.

Such techniques will continue to be of value, but what is needed more than their further multiplication is a reinculcation of the teaching atmosphere into the daily life of the individual practitioner. For postgraduate medical education to be most effective, it should be continuous and should be carried out in relation to individual patients in the community hospital. If the practicing physician could have informal and easily available guidance at all times at a level equivalent to that of a university hospital, he would be in the best position to improve the care of the patient in his own office, in the home, and in the hospital.

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To achieve this, the community hospital would have to become an educational institution in the true sense, a place where an interchange of ideas and experiences can occur between specialist and general practitioner and house staff and where clinical, bedside, and laboratory teaching can become a routine experience. If, instead of being isolated from such an atmosphere, the practitioner can be made a participant, the community hospital could provide at least a setting for the pursuit of the ideal of lifelong professional medical education.

Description of Hunterdon Program

I would like to describe the experiences of one rural community medical center that has attempted to actualize these concepts in its medical program during the past four years. Emphasis will be given to the question of continuing education of general practitioners, although the process necessarily involves the house staff, the medical student, and the specialist.

The Hunterdon Medical Center in Flemington, N. J., is a 120-bed voluntary general hospital serving a semirural population of about 45,000 persons. It is situated midway between New York and Philadelphia in an area, relatively devoid of large industries, deriving its income from poultry and dairy farming and light industry. The medical center arose out of the community's basic need for hospital services, since Hunterdon County was previously devoid of such facilities and its general practitioners depended upon adjacent communities for hospital and specialist care.

From its inception, the institution has enjoyed a unique history of cooperation between the community and the professional organizations inspired by farsighted local lay leadership. An account of the center's genesis and development has been published in monograph form,[1] and this monograph should be referred to for many of the background details that I am not including in this report. Some seven years were spent by community leaders in collaboration with the late Dr. H. L. Corwin of the New York Academy of Medicine and with representatives of New York University and the Commonwealth Fund in elaborating the philosophy of medical care that will be described. Financial assistance in the form of grants was made possible by the Commonwealth Fund, the Kress Foundation, and the New Jersey State Department of Health. The local general practitioners were consulted early and gave their approval to the over-all philosophy several years before any specialists were engaged.

Objectives of Program.—The objective of the center, briefly stated, is to provide a broad spectrum of modern medical services to a rural community at a level of quality equivalent to that practiced in the university medical centers. The distinguishing features of this program can only be enumerated here and are as follows: (1) a rural medical center that would provide the widest range of health services—diagnostic, therapeutic, preventive, and rehabilitational; (2) a staff that would make available to the patient the services of both family physicians and specialists working in a cooperative relationship; (3) an intimate association with a university medical school so that teaching and research could be combined with community service for the continuing education of the general practitioner and the betterment of medical care; (4) a group of "geographical" full-time specialists who would confine their practice to the medical center and pool their financial resources; and (5) a plan that would be economically feasible and supportable by local funds.

The most crucial, professional aspect of the Hunterdon experiment is the acceptance as a central principle that the optimum care of patients in a rural area can best be achieved by a cooperative effort between the general physician and the specialist. It is recognized that each has a unique contribution to make and that the betterment of medical care pivots on the existence of a satisfactory modus vivendi between these groups.

Present Operation.—The staff at the present time consists of 15 full-time, salaried specialists and 35 general practitioners, who are the family physicians of the community. Most of the general practitioners were in practice locally before the inception of the center. In addition, there is a part-time specialist staff consisting of 20 men in most of the medical and surgical subspecialties.

The full-time specialist staff consists of three internists, two general surgeons, an orthopedic surgeon, pediatrician, gynecologist and obstetrician, otorhinolaryngologist, ophthalmologist, pathologist, psychiatrist, anesthesiologist, urologist, and radiologist. Each of these men serves as the director of his respective service, carries out a consultation practice in the diagnostic center, and is charged by the board of trustees with the responsibility of maintaining university standards of medical care in his department. The members of the specialist staff do not practice outside the center, they see outpatients on referral from the general practitioner, and they do not make house calls except on his request. They are paid by fees received for their professional services and do not receive any support from nonprofessional sources such as income from the hospital for room and board. They pool their fees in a professional service fund from which each full-time member receives a salary that is dependent upon his professional rank and not on the type of specialty in which he is engaged. This fund cannot be used for nonprofessional purposes.

Every general practitioner in good standing in the county medical society may become, and, indeed, has become, a member of the attending staff of the Hunterdon Medical Center. The general practitioner is a co-member with the specialist in all activities of the hospital. There is no general practice department because it is felt that the organizational philosophy is such that the prerogatives and privileges of the general practitioner can be served without such a department. Indeed, he has an equal representation with the specialist in every aspect of the hospital's function, administrative and clinical, so that he enjoys a genuine sense of participation.

The general practitioner has privileges on all the major clinical services as determined by the medical board, which is made up of both general practitioners

and specialists in equal numbers. The general practitioner does not perform major surgery, but rather he concentrates on medicine, pediatrics, normal obstetrics, and minor surgery. He may admit patients to any service, and, when he does, he is expected to carry out the traditional duties of the attending physician.

Association with Other Institutions.—The Hunterdon Medical Center is a teaching hospital in every sense of the word. It is a member of the regional hospital plan of New York University–Bellevue Medical Center and a member of the university's administrative staff sits on the medical board. Each of the full-time specialists is a faculty member at New York University so that, in essence, there is available a local full-time teaching staff in the community hospital itself. Each full-time man spends one day a week in his respective department at New York University throughout the academic year carrying out a teaching responsibility, attending conferences, and keeping himself abreast of advances in his own field. The medical center has a house staff consisting of nine general practice and specialty residents and interns who are rotated from other affiliated hospitals of New York University. In addition, there are five to six senior medical students from three schoools—New York University College of Medicine, the University of Pennsylvania School of Medicine, and State University of New York College of Medicine. These students spend an elective period of from six weeks to three months at the center. Every patient, regardless of economic classification or social status, is a teaching patient in the sense that he is examined and studies are made on him by members of the house staff and that he may be presented at conferences, his management may be reviewed, and he himself may be examined by the chief of the service.

Routine on Various Services

Most of the teaching is carried out informally, often individually, and in close proximity to the bedside. A clearer understanding of the manner in which this is accomplished and in which it can influence the care of the patient as well as fulfill a learning experience for the practitioner is best gained by a review of the routine employed on the medical and pediatric services.

On these services, as on all the major services, each patient is considered to be the joint responsibility of the director of the service and the attending physician. The types of patients may be divided generally into three broad categories, and the degree of supervision and guidance carried out by the chief of the service will depend upon the patient's classification. Thus, about 50% of the patients have been hospitalized by the family doctor under his direct and immediate care. Most of these are treated for the usual illnesses that are well within the ability of the family physician to handle, with occasional guidance and supplementation by the specialist. Another 25% are referred directly to the care of a specialist either by virtue of the distance of the physician from the hospital or by reason of the complexity of the problem. In these cases, the specialist assumes the full role of management of the patient. The general practitioner, nevertheless, will usually see these patients several times a week and confer with the specialist about their management. On discharge the patient is returned to his referring physician with a detailed summary of his hospital stay, together with specific recommendations regarding diagnosis and future management. The last 25% of patients consists of those cases in which the family physician, although retaining the attending role, will need and request formal consultation by the specialist because of a difficult diagnostic or therapeutic problem.

The director of the service makes rounds every day with his house staff and reviews in detail the studies made by the house staff and the attending physician. He sees every patient regardless of who the attending physician may be, and, if necessary, he can take additional history from the patient and examine him. He then confers routinely with the family physician concerned when the latter makes his own rounds. In this way, the director of the service is able to supervise closely the general work of the service and can establish good standards of medical care with regard to diagnosis, management, and therapy. Each patient and his physician, in effect, have informal, routine consultations. When there are disagreements in management or diagnosis, these are discussed with the attending physician and not with the patient.

The general practitioner on his part is expected to see his patient, write admission and progress notes, communicate his orders to the house staff, and keep himself informed on the patient's progress. He carries the responsibility for admission and discharge and for communication with the family and patient regarding diagnosis, treatment, and so forth. He bills the patient for his services in the usual manner. There is no charge by the specialist for his over-all supervision, but he does charge a fee in the usual manner for those patients directly under his care and for all formal consultations.

Every effort is made to preserve the role of the family doctor as the attending physician. The specialist staff firmly believes in the inviolability of this relationship. No major change in management is made by the house staff or the specialist without the prior knowledge and consent of the family physician.

On the surgical service the general practitioner is responsible for the preoperative and postoperative care of his patient and the management of concurrent medical problems. He may assist in major operative procedures. The teaching emphasis is on surgical diagnosis, the indications for operation, preoperative and postoperative complications, and minor surgical procedures.

Family physicians deliver 85% of the obstetric patients in this institution. The obstetrician-gynecologist is responsible for the establishment of standards of obstetric care. He has a knowledge of all deliveries performed, keeps careful check of the number and kind of services performed, and is available for all obstetric emergencies and complicated cases. All the gynecologic surgery is performed by the full-time specialist. The teaching technique is similar to that on the medical and pediatric services, and the emphasis is on prenatal and postpartum care, office practice of gynecology, and the physiology of normal labor.

The same type of continuous informal consultation about individual problems is available with the radiologist, the pathologist, and, indeed, all the other specialists in the hospital not only on inpatients but on the care of patients in the physician's own office. The specialist is always available, and some of the most fruitful teaching occurs on the telephone, in the hallway, or over a cup of coffee.

The specialists maintain offices in the diagnostic center and see patients there on referral by the family physician. Twenty thousand such patients were seen last year. These patients are returned to their family physicians with a diagnosis and recommendations for therapy. Frequent telephone conversations, usually immediately after the examination of the patient in the diagnostic center, are followed by a formal consultation report. Each of these contacts with the general practitioner is actively used as an opportunity for teaching by all members of the specialist staff.

Opportunities for Continuance of Education

Informal Education.—It is apparent that the opportunities for the continuance of medical education on the part of the practitioner when he is intimately integrated in the framework of such an institution are many and excellent. Innumerable occasions are presented for reviewing current medical knowledge and information in the light of the problem at hand. This is by far the most efficacious kind of teaching for the general practitioner. The discussion of electrolyte problems in acidosis, for example, by means of a lecture usually has little permanent meaning for the busy practitioner. A similar discussion, however, about a case of uremia with which he is concerned has greater pertinence and much more lasting value. With this kind of relationship, the general practitioners are often stimulated to increase their own knowledge so that they can make a better contribution to the next discussion and improve their own management of the same situation in the future.

Another important teaching feature is the indoctrination of the general physician with the concept of the hospital as a center for community health services. Thus, he has ample opportunity to have contact with the whole breadth of ancillary medical services that are now available and necessary for optimum medical care, such as the departments of social service, public health nursing, psychology, rehabilitation, occupational therapy, and so on. Also, he is daily introduced to some of the preventive health services not ordinarily found in a rural hospital. For example, he is made familiar with the community educational activities carried on by members of the center staff, such as classes in weight control, parent education, and adult education and classes for diabetics. Multiple screening is carried on in the evenings and reports are sent to the general practitioner. All the community voluntary health agencies are housed in the center. A child guidance service is available to which the general practitioner is able to refer his patients for diagnosis and management, and, as always, his opinion is solicited as an important part of the management plan. A mental health unit is active under the direction of the psychiatrist, and the preventive aspects of psychiatry are emphasized as well as the importance of emotional factors in every disease process.

Further, there are many exemplifications of the modern need for group thinking about the solution of complicated medical problems. The practitioner becomes a member of many discussion groups concerning joint planning of patient care and is called upon to make contributions by virtue of his knowledge of the patient as an individual and his familiarity with the patient's environment.

The general practitioner is exposed daily to the inquiring and stimulating minds of young house staff members and medical students. He is encouraged to discuss his patients, and they are encouraged to ask him questions about diagnosis and management. Often, the general practitioner will join in making teaching rounds with the house staff and take part in the discussion of his own cases and those of other practitioners.

On all services, particularly the services of medicine and pediatrics, the practitioners are constantly impressed with the basic science information necessary for the proper understanding of recent advances in clinical fields. In every teaching activity, particularly those conducted at the bedside, the opportunity is grasped for emphasizing this type of information as being essential in the rational practice of medicine today. Presentation of this material is made a natural part of every clinical conference.

Formal Teaching.—We shall speak only briefly of the more formal teaching activities since they are not peculiar to this institution and are considered less important in the continuing education of the practitioner. A simple enumeration will suffice. Each major clinical service has a weekly conference planned around patients and the problems of current interest. Each Saturday clinical services rotate in presenting a correlative clinical conference, again using case material in the hospital, to the entire staff. General practitioners are often placed on the program and asked to discuss the care of their patients. Clinicopathological conferences are held monthly. Didactic sessions in which there is emphasis on the pathophysiology and basic science substratum of disease entities are held once a week by the medical services.

Many more instances of the formal and informal teaching activities of the Hunterdon Medical Center could be given. For example, the participation of the general practitioner in the monthly medical audit of his own cases and those of the specialist staff and his presence on important hospital committees are excellent ways of acquainting him with the standards necessary for a good quality of medical care. It is virtually impossible for a general practitioner serving as a member of the record committee, pharmacy committee, house staff committee, tissue committee, or others not to be influenced in the management of his own cases. The necessity of objective, mutual, and constructive evaluation of the quality of medical care by one's colleagues is thus emphasized and made an essential part of practice.

Comment

It would certainly be imprudent for those of us directly involved in this experiment to regard it as completed and of proved value in postgraduate education. Our report is one of progress, and we can say that there is every indication that the method is certainly worthy of consideration as at least pointing to a solution of some of the problems of continuing education. While a more objective evaluation of the merits of the Hunterdon experiment would be best made after many more years have elapsed, we think that there are a number of indications at present showing that its basic postulates are valid.

There has been an increasing usage of the inpatient and outpatient facilities by the general practitioner to the point that the need for expansion is pressing. Practically all the general practitioners and specialists associate on a first name basis, and social fraternization between both groups is a rule rather than an exception. Personal relations have not been strained by this cooperative arrangement. Most of the practitioners have accepted the idea of supervision and now voluntarily seek out the chief of the service on rounds to ask his opinion and recommendations regarding the care of the hospitalized patient. It is worthwhile to note that, in the four years of the operation of what would appear to be a finely balanced scheme of professional relationships, there has not been a single situation in which a difference of opinion was not resolved by discussion between individuals. The medical board has not been called upon to arbitrate a single dispute. With very few exceptions, the patients have accepted examination by the house staff and supervision by the chief of the service. They have not felt that their relationships with their own physicians were being disrupted thereby. Community support in annual drives has been excellent.

It is generally felt by the full-time specialist that the informal method of teaching has resulted in an improvement in the care of patients in the hospital and in the general practitioner's office. Many of the general practitioners need progressively less direction and guidance in the care of the common medical, pediatric, and obstetric problems. The full-time specialist staff has been well able to support itself on fees obtained through consultations and inpatient care.

The process has not been a unidirectional one. The specialists, too, have been educated by the association and have broadened their own experiences by contact with the general practitioners. They have learned to respect and appreciate the difficulties in his position and the magnitude of the demands upon his time and energies. They have had to continue their own educational progress by their weekly visits at New York University, by the preparation of their own teaching assignments, by the interchange of ideas with specialists in their own and other fields, by the conduct of research, and by the requirements of frequent consultations with practicing physicians in the solution of difficult clinical problems.

We have learned that the general physician has a definitive role in rural medicine, is desirous to improve the care of his patients, and is eager to be taught as long as it is done in a patient, informal manner and without pretension. We cannot predict the effect of this plan on the ultimate content of general practice in this community, but we feel that its presence will serve as an effective antidote to the "Jack-of-all-trades" concept of general practice. In our training of residents for general practice, we emphasize the idea of the family physician, based firmly in internal medicine, pediatrics, psychiatry, and possibly normal obstetrics. It is men with this orientation who will probably provide the bulk of medical care in our area in the future, and the plan described should be equally effective in their continuing education.

It would be misleading to imply that there have been no problems in this period of four years. To make this concept work smoothly has required a cooperative spirit on the part of specialists, general practitioners, administration, board of trustees, and community—all of whom have been willing to yield some of their traditional sovereignties to achieve the objectives of optimum patient care. It has been clearly demonstrated that the specialist staff would not be a threat to the economic status of the general practitioner. The possibility of undermining the professional status of the general practitioner was foreseen early, and this has been diplomatically avoided by the specialist staff and by the practitioners themselves.

A danger that has not materialized lies in the potentiality for such an arrangement to induce such a sense of security in the general practitioner that he will depend too heavily on house staff and specialist to carry out responsibilities that are properly his own.

Summary

We have described four years of experience at the Hunterdon Medical Center, Flemington, N. J., in an experiment in medical care and education that features the translation of the atmosphere and techniques of the university teaching hospital to a community rural medical center. The essence of this attempt lies in the fullest exploitation of the teaching potentialities of a community hospital by the integration rather than the isolation of the practitioner, by the effective establishment of a local full-time teaching faculty, and by emphasis in continuing, informal, individualized postgraduate education.

We think that this program offers some approach to a solution of the dilemma of continuing education. It appears to be practicable and should be translatable to other communities, with certain modifications. This method like all others can provide only an opportunity and a stimulus. The ultimate hope lies in the orientation of the physician as a perpetual student, deeply ingrained with an attitude of sustained scholarship. No community hospital program can substitute for this. It can only offer an atmosphere in which the ideals of scholarship can fluorish.

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CHALLENGES PRESENTED BY AND THE IMPORTANCE OF POSTGRADUATE MEDICAL EDUCATION

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• *Many resources are now available to the physician who wishes to keep up to date. The extent to which he utilizes them varies; he may neglect them entirely, or select what he thinks most suitable, or join a group in which attendance at certain meetings or courses is required. There is evidence of a dearth of programs of postgraduate education specifically designed for general practitioners, and evidence that some of the programs given have left much to be desired. The field bristles with challenges.*

The very definition of postgraduate medical education adopted by the Council on Medical Education and Hospitals [1] establishes objectives. The Council report includes in postgraduate education "those educational activities engaged in by persons possessing the degree of Doctor of Medicine which are primarily designed to *keep them abreast of their own particular field in medicine.*" These activities concern basic medical education as well as new developments in the field. I shall discuss the importance of and challenges presented by this area.

Of importance little need be said. We are discussing the techniques and procedures that prevent decay in practice and that supply to the physician new advances in medicine at the consumer's level and the means of supplying the fresh advances for patient benefits. To accomplish these ends the physician is, and should be, a lifelong student. Indeed, medical education is a continuing process from undergraduate to graduate and finally through postgraduate phases. The importance of education is obvious.

Types of Programs

True, the problems change in each of these areas, and the program for the postgraduate must be as clearly defined as are those for the undergraduate and graduate.[2] Here are the challenges! The field bristles with them. Vollan's report [2] indicated that the physicians he surveyed gained their continuing education in five general ways—by reading the medical literature, by professional contacts, in hospital meetings, in medical society meetings, and through attending postgraduate courses. The first three of these ways accounted for 90% of the time spent, the remaining two, 5% each.

In undergraduate as well as graduate medical education, the student groups involved are fairly uniformly graded and the programs generally require full-time study. In the postgraduate field these features, which lead to a relatively easily planned program, do not exist. Each man's problems, needs, opportunities, time, stimulus, background of experience, and training vary widely. Each man continues his education while in practice by the many means already mentioned.

Reading the medical literature, contacting associates, consultants, and representatives of pharmaceutical companies, and attending hospital meetings are parts of routine activities in practice, are highly individual activities, and are conditioned by the motivation and attitude of the physician. There is little that is compulsory, and each physician sets his own pace and seeks his own level. Much help and guidance are needed here. Experiments in the use of tapes, films, film strips, television, and correspondence courses to aid the physician in selecting and sorting out available literature show great promise. Much remains to be done. Even the additional methods of postgraduate training, attendance at medical society meetings, and especially attendance at more formal postgraduate courses are not compulsory, and again the physician sets his own pace. The only group that has met the challenge of required training is the Academy of General Practice, which demands attendance at approved meetings and courses as a requisite for continued membership.

Coordination of activities must be systematically planned. In my own state of Missouri, for example, programs of county and district medical societies are planned in cooperation with the activities of the Academy of General Practice to provide effective scope and coverage. Local hospital staff meetings and programs should be correlated and interrelated so that each physician can, by choosing state and national meetings to attend, along with selected refresher courses, tailor an over-all program to fit his needs. Local guidance is important and is a vital need that remains unmet. Stimulating the physician to participate actively in hospital and medical society meetings, by compulsion if necessary, is a tremendous challenge on the local front, where effective teaching talent is not always available. Planned self-instruction of groups in local and regional institutions, with some outside help and guidance, has not generally progressed beyond the level of casual and infrequent reports at staff meetings. When the physician-student actively participates and verbalizes, when he must visualize and organize, the learning process jumps in leaps and bounds. In the following papers from the Conference on Postgraduate Medical Education, programs and experiments in this field and a number of facets of this tremendous problem will be considered. These papers describe partial answers to the challenge of synthesis, organization, and integration of programs to round out and complete the needs of the practitioner.

Need for Flexible Program

In the recent study of general practice in North Carolina by Peterson and his associates,[3] the number of formal postgraduate exercises attended did not correlate with the quality of practice observed. Acquisition of journals did vary directly with the qualitative

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assessment of the physician's practice. Some superior physicians took very little formal postgraduate education, and some of the poorest were very assiduous in this respect. What is wrong here? The analysis beyond the record of the hours devoted to such activities is not clear. Is it in the courses offered, in the reasons for attendance, in the men themselves, or in some other sphere? We all know too well some of the shortcomings of many of the formal courses given. Ellis [4] has pointed out that the character of most instruction leaves much to be desired and that instruction is often carried out by techniques that were considered outmoded for medical students 50 years ago. Undergraduate and graduate programs have "captive" subjects. The student must learn mechanisms, items for which he might profess little interest and even direct antagonism, and aspects of health and disease that he dislikes, for he must qualify, pass examinations, or get official credit for licensure and certification; however, this is not so with the postgraduate. He can skip what does not interest him, avoid the dull lecturer, walk out if unimpressed, and return only if, by his own evaluation and standards, he feels like doing so.

Our most important challenge is to meet this heterogeneous, fluid, ever changing problem with a correlated, flexible, adaptable program that can be molded to fit the needs of the numerous groups concerned. We must understand the persons with whom we are dealing and give the individual what he needs and wants. Practicality does not permit us to go back to the choice of students entering medicine, to choose those who will be eager for continued study and who would strive to get it. That area is being diligently explored. Even if we go back and make the attempt, we really do not know how to choose students in this respect. We must take the groups available and sell them the right product. We have no monopoly of the physician's time as we have in the other fields of medical education. We must interest him, compete with indifference, and sell him a product he will buy and with which he will be so satisfied that he will return for more. Selling soap or automobiles could be much easier!

In respect to postgraduate education, there are three groups of physicians: those in one group go to any means for continued education, those in another shun any opportunities even when given them, and those in a third large group will take advantage of the opportunities if easily available or if put within reasonable reach. It is a great challenge to reach those needing the program. The Vollan report [2] stated that less than 5% of the hours of programs offered were specifically designed for general practitioners, who make up about half of the potential consumers of postgraduate education. Does this show that the challenge is being met?

Status of Postgraduate Programs

The blueprinting of the over-all needs for the area and the working out of an integrated program would make it possible for physicians to organize their own schedules to include refresher education as a part of their regular programs.[2] To improve on didactic methods, choice of other techniques of presentation, such sessions as group discussion, workshop exercises, case-work, and panels, especially in the physician's own institutions and geographical area, require skillful planning for effectiveness. Personnel, time, and finances of educational units are not adequate for continued education of the physician. Inspection and approval of formal courses to insure adequacy do not exist. The challenge is far from met. The postgraduate program is a stepchild to the other programs that have attained, despite the sharp controversies concerning approach and content, a tremendously high plane. Postgraduate programs—the training programs designed to keep the physician's knowledge adequate over the 30 to 40 years of his practice—still do not have their rightful place beside the other programs. What a challenge this is!

I have already spoken of the skills and salesmanship necessary in the teaching of this critical and sensitive group. Physicians leave their practices, give up income, and deny services to their patients to attend the sessions set up for them. The sessions must be worthy of this sacrifice. Yet, in a large part, formal postgraduate education has not achieved a place in teaching institutions equal to the needs. Too often the programs are incorporated into the operation established for undergraduate or graduate programs and are looked upon by the institutions as an added burden. These inadequacies are reflected in the teachers. Indeed, interest shown by the teacher is often lukewarm, which reflects in student response. This is understandable if teaching these courses is forced upon the instructor as an added job—an activity he does not want and that he does not consider an integral part of his work—and as a duty taking time he really wants for research and writing. He often does not understand his audience or indeed the problems his pupils face. Frequently he has never faced them himself. He may expound on techniques of pH determination or on the management of acid-base balance not available to 5% of those to whom he is talking and not understood by many more. He may describe details of operative procedures and leave the group entirely baffled. Sometimes he bypasses the real problem confronting him because of lack of success with the techniques used. I recall one such professor who abandoned the course in his field for general practitioners. These were the reasons, which, of course, he did not realize. Still, he was successful in use of the techniques of graduate medicine in refresher courses for specialists in his field, but he was not reaching the groups really needing the instruction.

Many teachers are willing to take exercises, such as formal lectures to large groups, prestige appearances, presentations at society meetings when they are "the program," or dissertations to groups from which potential referrals may come. Such exercises have their place, but, if this is the postgraduate program, it is but paying lip service to the problem.

Please do not believe from the above remarks that I consider all to be chaos in this field. There are institutions dedicated to the problem where postgraduate education has taken its rightful place and there are teachers with enthusiasm and understanding both in these institutions and in those dedicated basically to undergraduate and graduate instruction, but these men are too few. We have the great challenge of find-

ing, training, and developing teachers skilled in meeting postgraduate groups, poised in handling the difficult individuals and awkward situations in discussions, experienced in the problems outside medical centers, adept in choosing proper material for demonstrations, lectures, seminars, and panels, and interested and concerned about postgraduate education as an important and integral part of their daily responsibilities.

Finance is a great challenge. Undergraduate programs suffer from inadequate funds. The undergraduate pays one-third or less of the institutional cost of his education; someone else must pay the remainder. Postgraduate education is still more complex. Travel is more costly. Groups are small and their programs intermittent. The doctor loses income at home when he is away. Can and should the postgraduate course pay its own way? If the answer is either yes or no, how is the challenge of finance to be met?

Summary

The importance of postgraduate programs is undoubted. The field bristles with challenges. I have pointed up some of those that I consider of major importance. There are many others. Some of these problems rest upon the many facets of the program and the greatly varied needs and interests of the postgraduate student. In undergraduate and graduate programs, the scope is fairly well defined. This is not true in postgraduate education. It is a heterogeneous field. Regional needs vary, and planning and correlation are very important. How do we reach those with the greatest need? How do we improve self-education on the home front? What of compulsory programs? How do we coordinate and synthesize a complete program when there are such varied needs, agencies, or areas of teaching? Some courses must be long, some short; some on simple techniques or problems; some on general fields, some in specific areas; some concentrated, some intermittent; and some inside and some outside the institution. Where do we get worthy interested teachers? How do we solve the problems of responsibilities and finances? What of standards, inspection, and approval of formal courses? All these problems combine with the need for sandwiching programs into and making them part of the activities of practice. Much of this is responsible for the lag in the elevation of postgraduate education to its proper place alongside the other fields of medical education. To solve these problems is the great challenge. Postgraduate education must become "of age." We must face up to the problems.

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CURRENT ACTIVITIES IN POSTGRADUATE EDUCATION OF THE COUNCIL ON MEDICAL EDUCATION AND HOSPITALS

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• *An ad hoc advisory committee was appointed a year ago for study of useful approaches for improving the quality of postgraduate courses and other educational programs for physicians. The initial recommendations of the Committee to the Council on Medical Education and Hospitals is publication of a statement of objectives and basic principles. These include emphasis on use of clinical facilities, more effective educational methods, and the need for appraisal of courses, each of which is briefly discussed in this paper.*

In order to best explore the problems in the field of postgraduate medical education and useful approaches to their solution, the Council on Medical Education and Hospitals decided that it should have the advice of leaders in the profession having a diversity of backgrounds in and viewpoints on practice and medical education. An *ad hoc* advisory committee on medical education was appointed a year ago.

Postgraduate programs of hospitals and medical schools, sometimes in cooperation with medical societies, involve groups of people and methods that have close analogies with undergraduate and graduate medical education. In fact, all three phases may, and often do, involve the same educators. As a consequence, in planning and talking about the continuing education of physicians, we are dealing with a part of medical education as a whole rather than with some unique and intangible kind of thing. It is true, as Dr. William A. Sodeman said (page 366), that the practicing physican-students are more mature and present other differences because of their practices and family responsibilities. Even so, it would seem that the vitally effective elements of undergraduate and graduate medical education might well apply to the postgraduate aspect.

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Read before the 53rd Annual Congress on Medical Education and Licensure, Chicago, Feb. 11, 1957.

Need of Reappraisal

This kind of thinking has not characterized some of the programs labeled as educational for physicians. Because of lack of considered objectives, lack of coordination with the parent body of medical education,

and, generally, lack of applying the lessons already so painfully learned in the other phases of medical education, the postgraduate part has grown like Topsy, with the inevitable and confusing results of jerry-building. As Dr. Osler Peterson and colleagues[1] concluded in their recently published analytical study of general practice in North Carolina, "The nebulous influence of postgraduate study on the physician's performance suggests that a reappraisal of the methods employed in postgraduate courses is overdue."[2]

Peterson and colleagues are too kind in using the word "reappraisal." Too often there was never an initial "appraisal" of the methods. Considering that their study was limited to a relatively small number of physicians in a single state and that it lumped together all kinds of medical meetings with postgraduate courses, we can use his conclusion as being more a straw in the wind than a definitive indictment. However, scrutiny of the methods employed was a part of the Vollan survey[3] as well as of the deliberations of the Advisory Committee on Postgraduate Medical Education of the Council on Medical Education and Hospitals. In particular, the Committee felt the reservation so well expressed by Dr. Samuel Johnson when he said, "People have got a strange opinion that everything should be taught by lectures."[4] One might say, though, as Dr. David Sinclair, the British educator, observed, "The visiting expert is in the American tradition and so is the capacity to sit and be edified by a variety of long-winded discourses."[5]

Location of Postgraduate Education Programs

During the initial deliberations of the Advisory Committee, it was acknowledged that this field involves as sponsors medical schools, hospitals, and medical societies. It also became clear that adequate medical education requires clinical facilities with patients, laboratories, libraries, conference rooms, and audiovisual materials—in short, the usual facilities of a medical school or a teaching hospital. Therefore, it seemed reasonable for the Committee to recommend that hospitals and medical schools should be the location of postgraduate educational programs. This would mean that medical societies could function best in this field by working cooperatively with hospitals and medical schools in the area, with these institutions serving as the locations of any primarily educational programs—that is, in fact, the way the American College of Physicians functions in its courses each year throughout the United States.

In this regard, the present interest of medical schools is of importance. Last summer, as part of the annual query by the Council of medical schools in the United States for information needed to prepare the Annual Report on Medical Education, a special questionnaire on the postgraduate phase was sent to the dean of each school. In response to a question about the sense of responsibility that the school felt regarding the continuing education of physicians, 72 medical school faculties expressed in various ways some sense of responsibility. Of these, 40 schools' questionnaires contained a statement that indicated that postgraduate medical education was one of the major educational activities of the school, along with the fulfilling of the responsibilities for undergraduate and graduate medical education.[6] Dr. James W. Colbert Jr., chairman of the committee on continuation education of the Association of American Medical Colleges, in his report for the committee to the 67th annual meeting of the association last November, said in part, "The continued education of the physician is best assured by the establishment of an intellectual and educational environment supporting the responsibility of patient care. Such an environment will certainly require academic leadership and thus the role of the medical school will probably become greater rather than less."[7]

Statement of Objectives and Principles

It also became apparent to the Advisory Committee that a statement of the objectives and basic principles of postgraduate programs needed to be prepared as a first step in evolving a plan of action. It seemed impossible to make sensible recommendations to the Council of ways it could be of maximum assistance in this field unless the purposes or objectives of this field were more clearly defined. Assuming the correctness of the hypothesis that this field is a part of medical education and can benefit by applying what has been learned in developing undergraduate and graduate programs, the Committee thought that this experience could be distilled into a number of general principles as a guide for those responsible for postgraduate medical education. Such a document has been developed.

The first recommendation that the Advisory Committee made to the Council was that a brochure containing the objectives and basic principles of programs of postgraduate medical education be prepared and submitted to the Council for publication and general distribution. Its purpose would be to provide a basically sound approach, based on the common denominators of medical education, that could be applied to the various formats and types of postgraduate programs for their improvement. The Council on Medical Education and Hospitals approved the document for submission to the House of Delegates of the American Medical Association in June, 1957. The interested groups that Dr. Victor Johnson mentioned—including the Association of American Medical Colleges, the American Hospital Association, the American Academy of General Practice, the American College of Surgeons, the American College of Physicians, the Advisory Board of Medical Specialties—are being consulted in this first step, as they will be in later steps, in the Council's course of action, because only by going forward cooperatively and with generally agreed upon approaches can the challenges in this field be met.

If you will bear in mind that the guide has not yet been approved by the House of Delegates and so cannot be taken as an official statement of the American Medical Association, I would like to go over with you the present draft of the statement of objectives and basic principles. Please assume that, after each principle, from a paragraph to more than a page of explanatory material appears, which indicates in a

general way how the principle could be applied by hospitals, medical schools, and medical societies in their programs.

Parenthetically, please note that the word "program" has been used throughout the guide to denote not only a formal postgraduate course or series of courses but the educational activities sponsored by community hospitals, often in cooperation with medical schools. A basic document such as this should be flexible enough to apply to any primarily educational program planned by groups of physicians, including supplementary and experimental programs with use of television and audiovisual aids. The programs to which this statement is not intended to apply are medical society business and social meetings and conventions, because they cannot be considered primarily educational programs.

The guide in its present draft gives the following objectives of postgraduate medical education:

The ultimate aim of postgraduate medical education is to make it possible for each physician to use in his practice the modern medical knowledge that continuously becomes available. Adequate professional growth ensues through the participation of each physician in suitable programs of continuing education in addition to his own experience and reading.

Postgraduate educational programs should as a result of current advances in the basic science and clinical fields favorably augment and modify an adequate initial education. These programs should make possible the acquisition of such new skills in the field of original competence as scientific advances require. Furthermore, they should strengthen the habits of critical inquiry and balanced judgment that denote the truly professional and scientific man.

If the following basic principles seem simple, do not be surprised. Truly basic principles usually are simple. There is no attempt to mystify—rather the idea is to guide by pointing out the broad essentials. The essentials as given in the guide are as follows:

1. There should be administration of the postgraduate program by a responsible person having the respect and support of the professional staff of the organization or institution, an administration having as its goal an educational program in the highest interest of the medical profession, as epitomized in the objectives previously stated. There should be continuity of administration, evidence of careful advance planning of the program, and a suitable voice by the teaching staff in the postgraduate program.

2. The budget should be adequate to the educational program undertaken and to its continuing improvement.

3. The teaching staff should consist of physicians and their associates of proven ability, training, and experience with an interest in and dedication to the development of carefully planned educational programs in the best current intellectual and professional interest of the participating physicians.

I would like to quote a few points from the explanatory material pertaining to this principle:

There should be an adequate number of instructors for each program to permit the use of the more effective participative methods of education. In the other phases of medical education and in other fields of education, the number of students per teacher becomes much smaller as education becomes more advanced. This would seem to have significant implications in postgraduate medical education.

Instructors participating in any course or other educational program should be capable of providing explanation of the basic science mechanisms of health and disease and their clinical applications in the prevention, diagnosis, and treatment of disease. The essence of professional knowledge, as compared to purely vocational, is understanding of the basic science to provide a "know-why" as well as a "know-how" of the practice of medicine.

The resident staff of a hospital and particularly of a community hospital may form a valuable part of the teaching personnel of a postgraduate program.

To return to the principles:

4. The curriculum of any postgraduate medical education program should be the result of thoughtful planning well in advance of the date scheduled for the beginning of the program.

With reference to the words "thoughtful planning," the explanatory material adds in part,

Thoughtful planning also means that the content of courses and of other programs should be based upon the demonstrated needs and wishes of the physicians of the region, as well as upon advances in medicine. The means of ascertaining the needs and wishes of physicians will vary. Of great assistance is a close and cordial liaison among medical societies, medical schools, and hospitals of the region.

The explanatory material on curriculum also states:

Attention to the newer knowledge of the basic mechanisms of disease and of treatment should be a part of postgraduate programs along with the more immediately applicable information.

5. There should be available facilities that encourage participative methods of education. Though lectures by professionally well qualified speakers are a means whereby physicians obtain information, it is felt that such a method of education cannot alone provide an adequate postgraduate program in the context of modern education. The facilities mentioned above should include the availability when appropriate to the content of the program of patients and their case records and other necessary records; such as roentgenograms, electrocardiograms, surgical pathology tissues and/or reports; laboratories, library, conference rooms, classrooms, and audiovisual aids—all adequate for and suitable to the specific program.

This principle simply elaborates the conclusion of the Committee that I mentioned earlier, that hospitals and medical schools are the proper places for medical education, including the education of the physician in practice. The word "alone" with reference to lectures indicates that they have a place but cannot carry the whole burden of education. The explanatory material states:

A hotel ballroom or a lecture hall used alone and isolated from a hospital or medical center does not provide those essential facilities needed in modern medical education, whether it be for students working toward the M.D. degree or for physicians in practice enrolled in a course or participating in other primarily educational programs.

The principles continue as follows:

6. The educational methods should include more than a series of lectures or panel discussions in which the physicians are primarily passive recipients. Methods requiring active participation include live clinics and ward rounds, seminars, open question periods, laboratory work, and study of patients under supervision.

Regarding principle 6, I will say only that it is followed by the longest explanation because the Advisory Committee felt this to be a major problem area.

7. Methods of evaluating the effectiveness of postgraduate programs should be developed.

A very brief paragraph of explanatory material encouraging experimentation in ways of better accomplishing such evaluation and suggesting the educational and evaluative implications of medical audits follows principle 7.

8. Each physician's reward for participation in postgraduate medical education always should be his improved ability to care for his patients and the stimulation of his own spirit of intellectual adventure.

There is a short paragraph of explanation under this final principle that I would like to quote:

Any certificate granted at the completion of a postgraduate program or series of programs should not be or resemble a diploma attesting to special skill or be reasonably susceptible of such interpretation. Postgraduate medical education is not intended to provide an educational experience adequate for beginning the practice of a specialty or subspecialty. That is the concern of graduate medical education, that is, residency and fellowship training. Therefore, it would be inappropriate for any document attesting to postgraduate study to be subject to misinterpretation.

These are the principles, but by no means has the complete text of the document been given. This general guide is the first step in the course of action recommended by the Advisory Committee to the Council and endorsed by the Council. It is quite possible that more specific guides may be developed based on experience with the basic guide and on the wishes of the profession.

Appraisal of Postgraduate Courses

The second recommendation by the Advisory Committee was that the Council give consideration to appraisal of postgraduate courses and apply the results of such appraisal to the preparation of the annual list of courses published in THE JOURNAL of the American Medical Association. This would be consistent with the Council's policies in listing medical schools, internships, and residencies—policies that have been productive of real educational advances.

Such an appraisal would also seem desirable in itself to indicate those courses that are educationally worthy of the physician's time and money. It has been shown that courses of high quality stimulate physicians to seek such education, while a poor course is most discouraging to a physician's further participation and furnishes justifiable cause for his disappointment at the organization, quality, content, or methodology.

A further reason for advocating a continuing appraisal of postgraduate courses would be that such a plan would almost surely attract thoughtful attention to the basic guide as well as provide an additional incentive for the sponsors of programs to improve their offerings. The present annual list of unappraised courses and miscellany actually may be injuring the chances of raising educational standards in this field by giving tacit approval to some unworthy activities. Methods of appraising courses and other postgraduate medical educational programs are under active study by the Advisory Committee and by the Council itself, and the advice of the interested groups already mentioned will be sought.

Means of Increasing Participation in Postgraduate Education

A third step recommended to the Council by the Advisory Committee poses perhaps the most thorny problem of all. It is the recommendation that suitable means be developed for increasing the number of physicians who regularly participate in programs for their continuing education.

I suppose that, in an ideal culture, no outside stimulus, incentive, or recognition would be required because each physician would eagerly seek out, at any personal sacrifice, every available means of continuing his education solely because of an inner urge and an intellectual dissatisfaction with the *status quo* of his knowledge and skill. I do not expect this millenium to occur overnight. I do hope that a wider recognition of the important relationship of postgraduate medical education to the quality of medical care, coupled with an increased educational stature of the available programs, will attract many more physicians. However, the emphasis should be on quality. To date there has been too much attention given to quantity alone—to the number of physicians attending and the number of courses—and far too little attention given by many persons to the educational quality of the programs. While the availability of a sufficient quantity of meritorious educational opportunities is the ultimate goal, it would seem that attention to the quality of each program would best insure our reaching that goal.

It is probable that inculcating habits of scientific thought in medical students today will cause them to use their educational opportunities tomorrow and throughout their careers so that their knowledge will continue to be current. As Sir Henry Cohen, professor of medicine at the University of Liverpool, said at the first World Conference on Medical Education, "Above all, since medical knowledge is ever expanding, the undergraduate medical curriculum must favour the acquisition of enduring habits of work and thought and enthusiasm for study, so that the doctor shall remain a student throughout his professional life."[8] It seems to me that the future of postgraduate medical education lies with and should be planned to interest those physicians now recently out of their graduate medical education so that their competence in practice will continue at a high level as judged by the then current knowledge and skills.

This matter of finding means of stimulating participation by more physicians in postgraduate educational programs year after year will come under more active study by the Advisory Committee of the Council in consultation with other interested groups. However, the necessary preceding step would seem to be the giving of attention to the quality of the postgraduate medical education available. A general improvement in quality could, in itself, provide sufficient incentive, especially to the physicians who have graduated more recently.

Collection and Dissemination of Information

A fourth step recommended by the Advisory Committee is that the Council on Medical Education and Hospitals act as a central point nationally for the col-

lection and dissemination of information in this field. The Council has been increasingly active in this capacity in the past few years.

This symposium, Postgraduate Medical Education, is directly related to this function of the Council of acting as a "clearing house." In the past, attention has been largely on formal courses and comparatively little on other approaches to the continuing education of physicians. The papers of this symposium will concentrate on hospital activities in non-course education for practicing physicians.

One is often hard put to clearly delineate where, in such programs, the graduate medical education of interns and residents merges with the postgraduate medical education of the visiting staff. Every time I try to teach, I learn more than I teach, and this is also the usual experience of others. Certainly, when the visiting staff of a hospital is thoroughly involved in a well-planned and effective graduate educational program, the practicing physicians learn along with the residents. It is a participative and highly motivated situation for each, not a passively didactic one. It is truly continuous—not episodic. While I do not suggest that such hospital programs can replace formal postgraduate courses, it seems apparent that the hospital non-course programs have a much larger educational potential than has been realized except in a few places. In order to examine some of the possibilities and especially to pique interest in thinking of locally applicable variations, papers on four different examples of such programs were included in the symposium and appear in this issue of THE JOURNAL: Dr. Delp and co-workers on the University of Kansas program (this page), Dr. Wilkinson on the New York University plan (page 381), and Dr. Towsley on the University of Michigan plan (page 377), and Dr. Pellegrino describing the educational significance of the Hunterdon Medical Center.

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UNIVERSITY OF KANSAS PROGRAM IN POSTGRADUATE MEDICAL EDUCATION

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• Experience with postgraduate instruction in medicine has been continuous in Kansas since 1911, when the University of Kansas School of Medicine and the Kansas State Board of Health cooperated to arrange the first annual five-day summer school for health officers and physicians. The idea has evolved into the present program of postgraduate medical education, in which the university supplies administration, curriculum, faculty, facilities, budget, educational methods, and evaluative procedure with the advice and cooperation of several other organizations, especially a committee for postgraduate study appointed by the Kansas Medical Society. The program has been amplified to include work for specialists as well as generalists and for several professions allied to medicine. The use of participative methods of education, rather than lectures alone, is characteristic and vitally important. The enlisting of basic science instructors along with clinical instructors in the teaching teams is beneficial to both groups. The program is assured of acceptance if a mutually profitable relationship with the student body exists, and this can be insured only by continuing critical self-appraisal.

With the exception of the years 1922 and 1926, the University of Kansas has offered some type of postgraduate instruction in medicine almost continuously for the past 45 years. Such instruction began in June, 1911, with a cooperative venture between the University of Kansas School of Medicine and the Kansas State Board of Health in arranging and presenting, on the Lawrence campus, the first annual five-day summer school for health officers and physicians. After the first three years, these courses were transferred to the school of medicine at Kansas City and were expanded to two full weeks annually.

In 1927, the university extension division and the school of medicine offered their first courses on the circuit plan, using six centers in the state of Kansas for the original trial. In 1928, five short courses were added to the activities and became permanent fea-

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tures. In 1942, the president of the Kansas Medical Society requested the cooperation of the University of Kansas and the Kansas State Board of Health in providing intensive circuit-type courses for physicians of the state. Representatives of the three organizations were assembled as a joint advisory committee for the first planning session early in 1943. This union of energies has been continued to the present time.

The creation of the department of postgraduate medical education of the school of medicine, in 1945, served to stimulate expansion of all postgraduate activities. This step represented the attainment of a degree of maturity in the administrative structure, permitting organized planning, unified administration, and development of policy based upon sound principles in medical education. Although chief responsibility for the entire program rests immediately upon the university and the medical school, the state medical society still retains co-sponsorship through its committee for postgraduate medical study. The whole program of postgraduate medical education in Kansas is an integral part of the Kansas plan for rural medical care, formulated in 1948.

This is the historical background of one program of postgraduate medical education, which may be considered a prototype of programs involving a medical school and a state medical society. The barest fundamentals in any educational project, however, are a student, a teacher, and a curriculum; therefore, postgraduate medical education may be, and is, carried on in a successful manner using other methods.

Organization

The topmost administrative body of the University of Kansas is its board of regents, to whom the chancellor is directly responsible. He and the deans of the various schools formulate policy in an administrative pattern common to most state universities. The dean of the medical school, with the aid of his faculty, guides activities and controls policy within the school. Postgraduate medical education is designated as a distinct function of a separate department within the medical school. As such, it has its own responsibilities, prerogatives, and the usual amount of autonomy. Department administration is carried on by a chairman and an executive director.

The Kansas Medical Society has an administrative structure similar to other such state organizations. It has a committee for postgraduate study. Working directly with the medical school is a joint advisory committee composed of the representatives of the committee for postgraduate study of the medical society, the chairman of the committee on medical schools, the chairman and one member of the committee on rural health, one official from the Kansas State Board of Health, one official from the Kansas Academy of General Practice, and additional selected persons. These interested persons join with the chairman of the department of postgraduate medical education and the dean of the school of medicine as an actual working and policy-making group. The term "working" is used advisedly, because this group annually spends from 8 to 10 hours in session, discussing the past year's activities and problems facing the department and actually building in outline the content and format of programs for the ensuing year.

It might seem that the organizational structure is too bulky and loosely bound for good administration, but experience has proved this to be not so. The program administration, in the last analysis, falls directly and properly upon the medical school. The medical school also supplies the other essentials: curriculum, faculty, facilities, budget, educational methods, and evaluation to the enterprise.

Objectives and Purposes

The objectives of this program, as outlined in our last annual report, are—as might be expected—similar in general terms to all other such programs. Medicine has become so complex that it is obviously not possible to provide a completely detailed and sustaining knowledge concerning every medical and related discipline during a four-year period of study. Consequently, four years of undergraduate medical study, internship, and even residency supply merely the foundation for a lifelong study of medicine. Continuation of study aimed at the physician's acquiring new knowledge and skills, renewing former ones, and preserving and increasing professional competence constitutes postgraduate medical education. Providing the environment and atmosphere for accomplishing this is the objective of the Kansas program.

Formerly designed for and directed at the generalists in our region, the program is now geared to the needs of every physician, regardless of his interest or field of specialization. Preservation of competence, renewal of former skills, and acquisition of new knowledge is a need of all physicians, not of one group alone. The prime responsibility of the Kansas program is to the physician of Kansas, but, feeling a regional responsibility and encouraged by a regional response, the department no longer regards the state boundaries as valid limitations to its activities.

No longer are all programs prepared exclusively for physicians. We now recognize the need for providing continuation education for ancillary medical personnel, such as nurses, technicians, physical therapists, and others. More recently, we have assumed the responsibility for a fourth phase of medical education, namely, that of health education for the lay public. The real aim of all medical education should be improving the health of our people. Increasing the skills of all those engaged in medical care and increasing the understanding regarding health matters for those receiving the medical care are, therefore, prime objectives. This final statement also indicates quite clearly our potential student body.

Scope and Structure of Present Program

An immediate view of this program can be gained by examination of the course offerings and the enrollment. A characteristic of all the courses (see table) is the use of participative methods of education in courses other than rounds, clinicopathological conferences, laboratory work, seminars, or live clinics rather than use of lectures alone.

A total of 3,760 persons were enrolled in the postgraduate program from July 1, 1955, through June 30, 1956, with 2,319 physicians included in the total. The number of physicians enrolled in symposiums was 1,417; in intermittent courses, 546; in correspondence courses, 299; in courses in advanced, clinical, and investigative techniques, 53; and in clinical traineeships, 4. Total enrollment of persons engaged in allied and ancillary fields was 1,441 during the same period. There were 6 doctors of philosophy enrolled, 52 doctors of dental science, 199 medical technicians, 692 registered nurses, and 492 lay persons.

Local Attitudes Toward Postgraduate Education

During the past 10 years, the Kansas program of postgraduate education has matured, becoming an effective and quite extensive enterprise in continuation education. This situation, however, came about after almost 40 years of effort. The step in the program's development that has been the most recent and

Courses in Postgraduate Medicine Offered by the University of Kansas School of Medicine, 1956-1957

For the Medical Profession

Symposiums (short courses)	Intermittent courses
Obstetrics	General practice
Internal medicine	Surgery—operative clinics
Pulmonary disease clinic	Kansas circuit course
Gastroenterology	
Surgery	
Radiology and radioactive isotopes	Correspondence courses
The heart: cardiac arrhythmias	Interpretation of electrocardiograms—courses 1 and 2
Neurology	
Symposium on pain	
Pediatrics	
Electrocardiography	Special skills courses
Hematology	Radiological physics
Ophthalmology and otolaryngology	Histochemistry
Anesthesiology	Clinical use of radioactive isotopes
Cardiac auscultation	
Symposium on leptospirosis	

For Allied Professions

Operating room nurses institute	Nursing and nursing education
School health conference	Hearing and speech conference
Medical technology	Anesthesiology for the dental profession

Institute for Vocational Rehabilitation of Mentally Ill

that has given it the greatest stability was the creation of the department of postgraduate medical education within the medical school. This provided the needed administrative structure. Of equal importance and coming earlier in the development of this program was the cooperation with the potential student body represented in the state medical society. These two features would not have been sufficient to establish the program without the wholehearted acceptance by the dean of the medical school and the university administration of postgraduate education as a part of the responsibility of a medical school. This acceptance was outlined very clearly by the administration in 1948 as a part of the Kansas plan for rural medical care.

The public voicing of this responsibility of the medical school, which was expressed in such a manner as to impress every faculty member, met with the spontaneous approval of the Kansas Medical Society. It was an important step in renewing a desirable relationship with the practicing physicians within the state.

There has evolved in Kansas a working relationship between the state medical society and the medical school of the state university that has made possible an increasingly mature and extensive program of medical education. At no time in this relationship between the society and the medical school has there been conflict or friction that in any way impaired the prerogatives or fundamental policy of the school. The Kansas Medical Society with the postgraduate study committee has functioned as a helpful advisory committee and has at no time attempted to dictate policy. Such a pleasant relationship is in part the result of the medical school's approval of the over-all program and of the real acceptance by the society of this program as "their program," primarily designed for them with their help and for which they have a paternal attitude.

The faculty of the school of medicine has, by years of close association with the postgraduate program, become more sympathetic toward the additional burden of this phase of teaching. When the faculty was smaller, resistance did exist, but it was lessened by the wholehearted acceptance by the dean and the university administration of postgraduate education as a part of the school's responsibility. The structuring of a new department of postgraduate medical education with a departmental chairman, an executive director, and adequate personnel to do much of the routine work added a new dignity to the local program and administrative sanction to its permanence. All of this served to diminish the objections of the overworked undergraduate teacher who had not originally thought that such activities would be included in his duties. This was particularly true of the basic science instructors. Coloring the reluctance of this group was their inherent fear of disapproval when they appeared before clinicians. The gradual fortification of the faculty with additional members and the inclusion in their initial interviews of an outline of responsibility to postgraduate education has overcome this problem. At present, there is not a single member of any department of the medical school who does not willingly and frequently help with this form of teaching. One basic science teacher has, on several occasions, stated that he has never had previously such an excellent opportunity to assay the results of his undergraduate teaching.

The constant participation of basic science teachers along with clinical teachers in teaching teams, both in the circuit program and in short courses, has done much to eliminate the schism between basic scientists and practicing physicians. It has vastly improved the morale of the basic science teachers by fostering a closer relationship with men who use their discoveries in daily practice. This team association has also done much to improve the level of teaching by the clinician, who all too often is quite offhand in interpreting disturbed physiology and other basic phenomena if there be no one around to check this enthusiasm.

The liberal use of "guest" faculty members for participation in all short courses lessens the burden on our own faculty, but the local faculty assumes full responsibility for the circuit programs as well as for the clinical traineeships. For the short courses, they assist with ward rounds, conferences, and panel dis-

cussions, participating only occasionally in didactic presentations. Distinguished guest faculty members have always been used in this program as a means of supplementing our own staff and of increasing program appeal and effectiveness. There is no question about the soundness and popularity of the practice among both our faculty and the enrollees.

Self-analysis and Evaluation

The ultimate aim of postgraduate education today is the fostering of the best quality of medical care by each practicing physician. It, therefore, behooves an alert administrator in this field to appraise or inquire into the character and type of practice in the region served. He should learn of the needs and desires of his potential student body concerning program content, format, instructional staff, favorable dates for courses, and appropriate fees.

One can immediately appreciate the need for perpetual self-analysis and evaluation as elements in the continuation of successful operation of a program of postgraduate medical education. No medical administrator should be satisfied with organizing such a

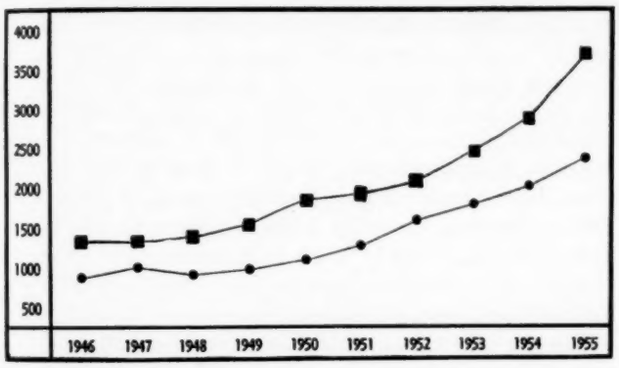

Fig. 1.—Graph showing summary of enrollment from 1946 through 1955 at University of Kansas School of Medicine. The enrollment of physicians (circles) is compared to the total enrollment (squares).

venture and then sitting back complacently to let it operate year after year without continuing study, appraisal, evaluation, and improvement.

The department has sought such information from its student body in several ways: 1. Questionnaires are sent out by the medical society to individual practicing physicians inquiring about their own types of practice as well as about many of the common questions confronting a producer of postgraduate courses. 2. Registration data (fig. 1) are secured on each enrollee and tabulated annually, including city and state of practice, field of practice (fig. 2), medical school, year of graduation, and distance traveled to attend program. This tabulation is subjected to continuous analysis. 3. An individual study of the patients seen and treated by a group of representative general practitioners holding appointments as medical school preceptors is currently being carried out with the assistance of our medical student preceptees. 4. Each program produced is subjected to critical study by the submission to each enrollee of a questionnaire concerning the specific program, its content, format, teaching techniques, and fees and suggested improvements.

Data on the 2,319 physicians enrolled in postgraduate courses in 1955-1956 show the type of information that is obtained from enrollment questionnaires. A study of the geographical distribution revealed that 1,096 physicians were from Kansas, 1,211 from other states, 2 from territories of the United States, and 10 from foreign countries. Data on distance traveled to attend courses during the same period showed that 328 physicians traveled less than 25 miles,

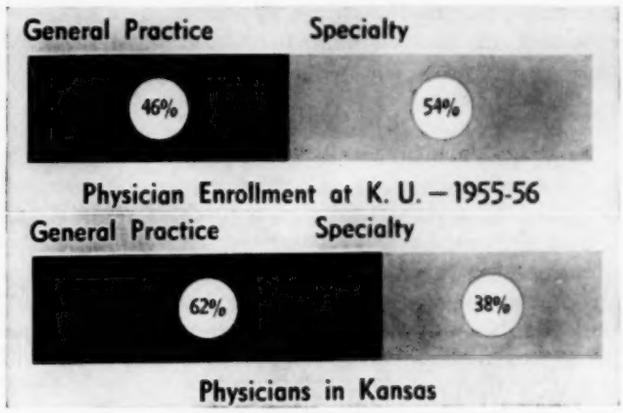

Fig. 2.—Graphs showing percentages of physicians in general and specialty practice enrolled in postgraduate courses at the University of Kansas in 1955-1956 compared to percentages of physicians in general and specialty practice in Kansas.

186 from 25 to 100, 256 from 100 to 200 miles, 360 from 200 to 300 miles, 157 from 300 to 500 miles, 96 from 500 to 1,000 miles, and 60 over 1,000 miles.

Collection of registration data and "postmortem" information on programs is routine and continuous. The surveys of medical practice in our state, as well as the studies on the individual practitioner with regard to such factors as his training and his field of

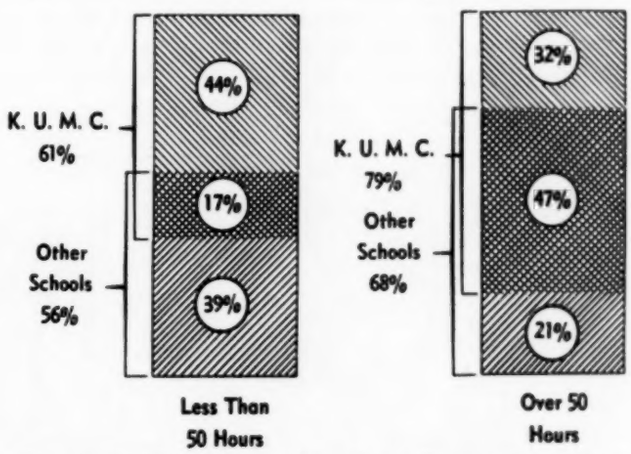

Fig. 3.—Graphs showing place of enrollmen of physicians taking less than 50 hours and more than 50 hours of postgraduate work in 1953, 1954, and 1955.

practice, are special projects to be repeated at suitable intervals (fig. 3). Securing such information is essential to the success of a postgraduate program.

Physicians are compelled to attend continuation study exercises, an impelling conscience being the effective incentive. Only the Academy of General Practice has had the courage to suggest more effective compulsion. The postgraduate student must be attracted to a program and his interest must be capti-

vated to hold him. His body cannot be captured as can the undergraduate's. The program must be sound, useful, and inspirational if he is to remain. It must promise the same for the future if he is to return. Programs must be planned carefully, promoted effectively, and produced well if they are to serve their purpose. This requires constant study and re-study of one's own problems. To date, there is no large and reliable clearing house of information or fostering influence to guide the school, department, or any other producer of postgraduate medical education. Each must chart its own course.

Future of Program

Looking to the future, we envision retention of the present administrative structure, with the program operated as a department in a medical school, with use of the same teaching staff and retention of close identity with the parent medical school. Establishing a separate division or school would sacrifice something built deliberately—a teaching staff committed to all phases of medical education. The close liaison with the state medical society has been a major factor in the growth and security of our program, and retention of this relationship is essential.

Equally necessary is continued long-term planning of the programs of intermittent and short courses to fit the needs of the physicians of this region, with careful attention being given to curriculum material, effective methods of presentation, and selection of a competent faculty.

One of the United States' real contributions to medical education has been in the field of graduate medical education. Residency training is a proved method of giving, at least temporarily, a high degree of professional medical competence. The usual short and intermittent courses cannot be compared with it for effectiveness. This observation leads to a desire to increase our clinical-traineeship teaching, simply because of the superiority of this method.

Promoting the acceptance of a fourth phase of medical education as a reality and engaging in and assisting voluntary health organizations in health education are considered to be other important future objectives.

We must continue the collection of data from registrants—the study of problems and practices of the student body. This sort of research and critical analysis is, at present, the only means available for evaluation and improvement of the program. Ultimate determination of whether a program is raising the level of medical care and inspiring the hoped-for response in the student body defies a direct approach. Further research in methods and modalities of teaching should represent another field of study for a progressive program. Increased use of television and the development of new home study courses and exploratory courses in yet untried fields represent further possibilities in development.

Summary

The Kansas program of postgraduate medical education has, during the past 14 years, gained new vitality and purpose. Most important in this change has been the association with the state medical society—members of which compromise the program's student body. Next in importance has been recognition by the university and the medical school of their prime responsibility for this phase of medical education. The school's acceptance took tangible form in the creation of a department of postgraduate medical education, which gave the program administration, faculty, facilities, and a budget. The department provided the remaining essentials—curriculum, teaching methods, and self-analysis and evaluation.

The future will be secure if sound educational policies based upon continuing critical self-appraisal are maintained. Acceptance of the program is assured so long as the mutually profitable relationship with the student body exists.

Types of Thyrotoxicosis.—Thyrotoxicosis embodies three main components—thyrotoxic, mechanical and cardiac—which vary in importance in any individual case. The thyrotoxic component includes all the manifestations of thyroid overactivity, the mechanical component consists of pressure effects exerted by the bulk of the goiter upon the trachea or oesophagus, and the cardiac component comprises auricular fibrillation and congestive heart failure. Cases of thyrotoxicosis may be subdivided into primary and secondary types. . . . Primary thyrotoxicosis, or exophthalmic goiter, usually affects young women whose thyroid glands are believed to have been previously normal. The clinical picture is almost wholly one of the thyrotoxic component. The goiter is smooth, diffusely enlarged, symmetrical and seldom large; pressure effects upon the trachea or oesophagus are exceptional, hence there is no mechanical component. In the absence of pre-existent rheumatic or other heart disease the cardiac component, as manifested by thyrotoxic auricular fibrillation and congestive heart failure, is very rare. Secondary thyrotoxicosis, or toxic nodular goiter, on the other hand, affects middle-aged or elderly women who have often possessed a previously simple goiter for many years. With the passage of time the goiter has slowly enlarged, becoming nodular and asymmetrical. Pressure upon, or deviation of, the trachea and oesophagus is common and the lower border of the goiter may have descended into the thoracic inlet. The mechanical component is thus often a marked feature. The cardiac component is also common and shown as auricular fibrillation or congestive heart failure, but the thyrotoxic component is, as a rule, less evident than in primary cases.—L. Martin, M.D., F. R. C. P., The Treatment of Thyrotoxicosis, *The Practitioner,* June, 1956.

UNIVERSITY OF MICHIGAN PLAN FOR POSTGRADUATE MEDICAL EDUCATION

AN EXAMPLE OF THE POTENTIALITIES OF REGIONAL HOSPITAL–MEDICAL SCHOOL AFFILIATION

Harry A. Towsley, M.D., Ann Arbor, Mich.

• *The best place for a physician to continue his education is in his own hospital, where he can assume a sincere obligation for his share of the training program. The development and maintenance of a satisfactory graduate training program in the regional hospital by members of its own staff provide a continuous opportunity for intellectual stimulation. It has been observed that practicing physicians in regional hospitals, through their repeated contacts with members of the faculty where there is a visiting program as provided by the University of Michigan, are more prone to utilize consultation, and such consultation, whether it be formal or informal, provides immeasureable education opportunities at all levels.*

The faculty of the University of Michigan Medical School, in addition to its primary obligations to provide undergraduate medical education, to conduct research, and to care for the sick, is engaged in three major activities in the field of postgraduate medical education. These are the extramural, circuit program; the intramural, refresher courses; and the program for affiliated hospitals. In the order listed, each program provides increasing potentialities for continuing education for practicing physicians.

Extramural and Intramural Programs

The extramural program is a combined project of the Michigan State Medical Society, the Michigan Department of Health, Wayne State University College of Medicine, and the University of Michigan Medical School. Programs are arranged by the department of postgraduate medicine at the University of Michigan, utilizing the faculty members of the two medical schools. Nineteen centers served by this program are located mainly in the rural areas of the state. Teams of two to three faculty members present lectures on prearranged subjects in each center. Where facilities permit and audiences desire, clinical conferences are held. These programs provide a brief postgraduate educational experience twice yearly for approximately 800 physicians (fig. 1).

The intramural program provides some 17 refresher courses at the University of Michigan in the various fields of medicine. These courses are of three-days' to five-days' duration. The average annual registration is approximately 900 physicians. The opportunity for close intellectual exchange between teacher and practicing physician in these courses leaves little doubt as to the educational stimulation derived.

Programs for Regional Affiliated Hospitals

The programs for affiliated regional hospitals in Michigan encompass three educational activities in 19 hospitals. These activities include the residency program in 15 hospitals (see table), the two-year general practice program in 2 hospitals, and the program for general practice experience for undergraduate students in 2 hospitals. The distribution of these hospitals is shown in figure 2.

The potentialities for postgraduate medical education for the physicians comprising the attending staffs of these hospitals are broad and continuous. They are in direct proportion to the physician's interest, enthusiasm, and perseverance in the conduct of successful training programs in the regional hospitals. The basic objectives and method of conduct of the affiliated-hospital programs were clearly defined by Wilkinson,[1] who served as coordinator at the time of their inception. However, to set forth more clearly the potentials for postgraduate education at the present time, a brief review of the method of operating is presented.

Residency Program.—Of the 15 hospitals participating in the residency program, 3 are affiliated for residencies in internal medicine, 1 for surgery, 5 for medicine and surgery, and 6 for medicine, surgery, and obstetrics and gynecology, making a total of 32 affiliations in the three specialties. A hospital must first obtain approval from the Council on Medical Education and Hospitals of the American Medical Association for the residency program for which it seeks affiliation. Under the terms of affiliation, the hospital agrees to provide a minimum teaching program consisting of (1) teaching ward rounds of at least one-hour's duration on the affiliated service five days weekly; (2) a weekly, radiologic, clinical, and clinicopathological conference; and (3) outpatient experience for the residents on the affiliated service. The individuals responsible for the teaching programs on the affiliated service must be diplomates of their respective board or fellows of their respective specialty college.

The medical school assists the regional hospital with its training program in two ways. First, courses at the University of Michigan in the basic sciences and their clinical correlation are provided for the residents. These courses vary according to the specialty affiliation.

The surgical residents from hospitals with a three-year approved residency come to the university after two years in residency in the affiliated hospital. Approximately half of each day for nine months is devoted to the review of the basic sciences as they may pertain to surgery, under the direction of the basic sciences faculty. The second half of each day is occupied with the clinical correlation and application of the basic sciences. This correlation, under the direc-

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Read before the 53rd Annual Congress on Medical Education and Licensure, Chicago, Feb. 11, 1957.

tion of members of the clinical faculty, is carried out through clinical conferences, lectures, demonstrations, and bedside teaching. The remaining three months of the year, the residents may elect to spend their time in one of the surgical specialties. Upon completion of the year at the University Hospital, residents return as chief residents to their hospitals for the third and final year of training. The year at the medical school is credited as one of the two years, over and above the three years of residency, required of group 2 candidates for certification by the American Board of Surgery.

Currently, residents in internal medicine spend nine months of the second of their three years in a similar course, with the choice of electing to spend the remaining three months in one of the medical specialties at the university. Also, residents in obstetrics and gynecology have had a special six-months' course in basic sciences pertaining to that specialty and a similar experience in correlation and application directed by the clinical faculty in that field. All residents in these courses are expected to attend the major teaching conferences held by the clinical departments of the medical school in the specialty for which they are affiliated.

Hospitals in Michigan Affiliated with University of Michigan Medical School for Residency Training

	Internal Medicine	Surgery	Obstetrics and Gynecology
Alexander Blain Hospital, Detroit	x		
Blodgett Memorial Hospital, Grand Rapids	x	x	
Bronson Methodist Hospital, Kalamazoo	x	x	
Butterworth Hospital, Grand Rapids	x	x	x
Edward W. Sparrow Hospital, Lansing	x		
Hurley Hospital, Flint	x	x	x
Leila Y. Post Montgomery Hospital, Battle Creek	x	x	
McLaren General Hospital, Flint		x	
Mount Carmel Mercy Hospital, Detroit	x	x	x
Pontiac General Hospital, Pontiac	x	x	x
Saginaw General Hospital, Saginaw	x	x	x
St. Joseph's Mercy Hospital, Ann Arbor	x	x	x
St. Joseph Mercy Hospital, Detroit	x	x	
St. Mary's Hospital, Grand Rapids	x	x	
St. Lawrence Hospital, Lansing	x		

Visiting Program.—The second method by which the university assists the affiliated hospital is by providing a regularly scheduled visiting program by members of the faculty. The purpose of these visits is to aid in the teaching and to evaluate critically the training program in each hospital. Six faculty visits are made annually in the specialty for which the affiliation has been made. Hospitals affiliated for two specialties are visited 12 times annually. Those affiliated for three are visited 18 times each year. Prior to 1954, nine visits were made annually by the faculty for each specialty affiliation. When the undergraduate enrollment was increased to 200 students in each class, however, it became necessary to reduce the visits to the present number.

Each member of the faculty visiting the affiliated hospitals is prepared to present a didactic lecture on a prearranged subject in his field of medicine and to conduct a clinical conference on patients presented by members of the house staff. Both the house and attending staffs are urged to be present. Notification of these scheduled meetings is made well in advance by the education committee in each hospital either by postal card, hospital news letter, or bulletin board.

In addition, the faculty representative makes teaching ward rounds with the residents, interns, or students and any member of the staff who wishes to attend. He also reviews records of patients for content and thoroughness of study and holds general conferences with the house staff, during which he discusses their teaching program or any other items within his scope that they may wish to consider. After his visit, each faculty representative makes a written report to the chief of the service that he represents and to the coordinator of the program. These reports include his general observations, the number of members of the active and house staffs attending the conference, an evaluation of the degree of interest and enthusiasm on their part, a report on the general character and quality of patient records, and especially his evaluation of the training program.

In annual visits to these hospitals, the coordinator of these programs holds a conference with the interns and residents for the purpose of obtaining their evaluation of the training program. With this information and the critical evaluation submitted by each of the faculty visitors during the year, a conference is held with the education committees, and attempts are made to correct any weaknesses or omissions found in the teaching program. Further, a day-long conference is held at the university once each year for all the education committees of the hospitals and directors of each affiliated hospital with the chairmen of the clinical departments of the medical school or their representatives. In these conferences, the mutual problems in the over-all programs are considered.

Program for Training in General Practice.—The program for training in general practice is specifically designed to provide at least two years of training for recent graduates who want to enter general practice. It combines teaching in the environment of a university hospital with the practical approach to common medical problems as they are found in a community hospital. Mercy Hospital, Benton Harbor, and Midland Hospital, Midland, both staffed by practicing physicians representing both the specialties and general practice, are affiliated for this program. To become affiliated, a hospital must possess, in addition to the physical qualifications to meet the requirements of the "Essentials of an Approved Internship," [2] a medical staff that will agree to provide the minimum teaching program outlined above in the discussion of residency affiliation.

In an attempt to solve the problem of the distribution of doctors to the less urban communities in the state, hospitals located in rural communities are selected for this program. The university assists these hospitals by selecting from 10 to 12 interns annually. Each intern spends six months of each of the two years at the University Hospital and six months of each of the two years in one of the affiliated hospitals, as an intern the first year and as an assistant resident the second. In this manner, each affiliated hospital is furnished with at least two interns and two assistant residents at all times. The university also provides a teaching resident from the medical and surgical services of the University Hospital on a rotation basis of three to six months. The teaching resident, in addition to helping with patient care, assists with the organiza-

tion of the teaching program by planning with the education committee of the affiliated hospital the rotation of interns and residents and the scheduling of ward rounds and conferences, insuring that members of the attending staff meet their scheduled teaching obligations. He also shares in the teaching program.

Further assistance is provided to these hospitals by the visiting program and by evaluation conferences, as described in the discussion of residency affiliation, except that visits to these hospitals are made nine times each year by teams of two faculty members representing the four major specialties. The conferences with the coordinator are held usually twice annually until the program is established. James Decker Munson Hospital, Traverse City, formerly affiliated for rotation of interns, now procures its own interns on the matching plan. At its own request and expense, it continues to receive the visiting program from the university.

Program for Student Experience in General Practice.—The program for student experience in general practice is a relatively new venture at the university, having been established two years ago. The senior year in the medical school is divided into five nine-week sections, one of these sections being a vacation period. The majority of students elect to obtain experience by serving as externs in many hospitals during their free period. This program is made available especially for those who are interested in general practice.

Two small community hospitals, Emma L. Bixby, Adrian, with a 60-bed capacity, and Memorial Hospital, Owosso, with a 120-bed capacity, in the rural areas of the state were selected to provide this experience. The staff in each hospital is composed of doctors both in general practice and in the specialties. Under

Fig. 1.—Map of Michigan showing locations of extramural teaching centers in relation to location of the University of Michigan (X).

the terms of affiliation, the staffs of these hospitals agree to provide supervised educational and clinical experience and to conduct a teaching program for students.

The university assists these hospitals by providing 12 scheduled faculty visits annually by representatives from the four major specialties. The content of these visits is similar to that in the residency and general practice programs.

The visiting programs to each hospital require three to five hours of the faculty member's time, excluding travel. A minimum of one and a half to two hours is devoted to a combined lecture and clinical conference. The remaining time is occupied with ward rounds and conferences with the residents, interns, or students.

Statistics and Finances of All Programs.—For all of the programs in the 19 hospitals, the faculty averages 264 visits and travels more than 26,000 miles each year. Over a five-year period, an annual average of 65 visits from senior clinical instructors, 99 from assistant pro-

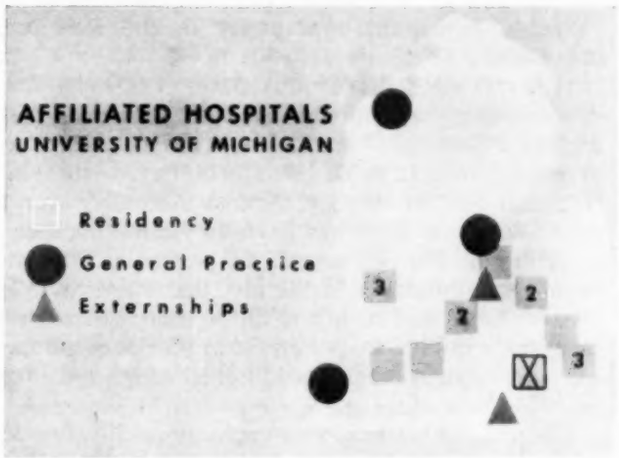

Fig. 2.—Map of lower peninsula of Michigan showing locations of hospitals affiliated with the University of Michigan for various programs. Square with X superimposed denotes the location of the University of Michigan and of an affiliated hospital in the same community.

fessors, 73 from associate professors, and 17 from professors have been made under these programs. All these persons are full-time or geographical full-time members of the faculty of the medical school.

The financial support of these programs has an indirect relationship to their recognized potential for postgraduate education. The W. K. Kellogg Foundation, with a very generous grant, supported these programs for the first five years of their operation. They have been supported for the last five years by the affiliated hospitals and by general funds from the university. The hospitals carry about one-third of the cost. It is of particular interest that the members of the attending staffs, through contributions to the regional hospitals, provide about 75% of the funds coming to the university from the hospitals for support of the program. The amount contributed by the staff members in the affiliated hospitals is sufficient to cover travel and hotel expenses of faculty members, faculty honoraria, and part of the administrative expense. The staff members, by contributing to these funds are, in effect, paying for their own opportunity for continuing education provided by these programs and, at the same time, supporting materially the education of residents and interns.

Potentialities for Postgraduate Education

The potentialities for postgraduate medical education, as exemplified in these programs, may be divided into two general categories—the direct and the indirect.

Direct Potential.—The direct potential for postgraduate education, if measured in terms of the number of hours of lectures and conferences provided by medical

school faculty members who have gained recognition in their special field of interest, would provide to the physicians in hospitals affiliated for one residency program 12 hours of postgraduate experience each year; to those in hospitals affiliated for two residency programs, 24 hours; and to those in hospitals affiliated for three residency programs, 36 hours. Physicians comprising the staff in hospitals affiliated for general practice training would receive approximately 18 hours of direct postgraduate education in the four major specialties, while staff members in hospitals affiliated for the student program are provided 24 hours of postgraduate education opportunity in the four major specialties.

It is estimated that approximately 1,500 physicians, representing the combined attending staffs of the 19 affiliated hospitals, would have the opportunity of receiving from 12 to 36 hours of postgraduate education annually in these programs. Actually, over the past five years, there has been an annual average attendance of 600 physicians. Of particular interest in regard to attendance is the fact that close to 75% of the available staff members in the more isolated rural hospitals exhibit a keen interest in postgraduate medical education, as manifested by their continued attendance at these functions.

Clinical conference teaching is generally regarded as far more stimulating and rewarding than the usual didactic lecture, particularly when the clinical material presented involves the patients in the doctor's own hospital. Unfortunately, all of the affiliated hospitals do not take full advantage of this method of teaching during each visit. In those hospitals, the potential for postgraduate education to the staff is reduced.

Indirect Potential.—The indirect opportunities for the continuation of professional growth for the practicing physicians in the regional hospitals are available in a number of ways. For example, the resident who has attended the program on the basic sciences and its combined clinical correlation and has taken advantage of the many teaching conferences available to him in his specialty at the university returns to his hospital with the knowledge of new diagnostic and therapeutic measures and new laboratory procedures, which he can disseminate to the members of the staff through conferences, ward rounds, and daily contacts.

The same may be said of the intern in the general practice program when he returns to the affiliated hospital for his second tour of duty and of the teaching resident who carries with him the teaching of the department in which he had his training at the university. To a far lesser degree, the medical student, with his recently acquired knowledge from the various departments in the medical school, may contribute in a similar fashion.

The development and maintenance of a satisfactory graduate training program in the regional hospital by members of its own staff provide a continuous opportunity for intellectual stimulation. Those who take the responsibility for teaching ward rounds, of necessity, are stimulated to peruse more critically the medical literature in the attempt to teach in a creditable manner. The repeated attendance and participation by the staff members in the teaching functions within their own hospital, such as clinical, clinicopathological, and x-ray conferences and journal club, provide unlimited potentialities to the practicing physician for continuation of his education, particularly when these functions are carried out as teaching exercises. The presence of a resident, intern, or student who is given the opportunity to discuss the differential diagnosis with the practicing physician at the bedside serves as a stimulus for more thorough study of the patient's problems, thus reducing the possibility of error in diagnosis and treatment.

In those hospitals with good teaching programs for the house staff, there appears to be a much freer use of consultation. Whether they be formal or informal, such consultations provide immeasurable education opportunities at all levels. It has been observed that practicing physicians in regional hospitals, through their repeated contacts with members of the faculty through the visiting program, are more prone to call faculty members in consultation for their difficult problems.

It has been repeatedly stated that the best place for a physician to continue his education is in his own hospital. This is true as long as he maintains an open, inquiring, critical mind and a keen interest in the progress of the science of medicine. This opportunity is greatly enhanced if his hospital is charged with the responsibility of providing a satisfactory training experience for residents, interns, or medical students, particularly if that obligation is discharged with pride in the products of its efforts.

The potential is further enhanced if the physician himself assumes a sincere obligation for his share of the training program offered by his hospital. Whether it be teaching at the bedside or in the scheduled conferences or directing journal club, adding his bit to the discussion will be stimulating and rewarding in that the knowledge gained therefrom will sooner or later be of benefit to his patients. In those hospitals where an honest and sustained effort to provide the best possible training program for the house staff exists, the practicing physician will find an unequaled opportunity for continuation of his own education.

Without the support of a university administration and a medical faculty dedicated to the belief that a doctor's education should not end with graduation from medical school or at the end of his internship or residency and without donation of time by the practicing physicians in the affiliated hospitals for educational programs for residents, interns, or medical students, postgraduation education opportunities for the less-motivated practicing physician will not exist in his own hospital, where it is ripe for his taking. It is believed that the regional hospital–medical school programs offer the practicing physician an unequaled potential for continuation education.

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NEW YORK UNIVERSITY PLAN

AN EXAMPLE SHOWING THE POTENTIALITIES OF REGIONAL HOSPITAL–MEDICAL SCHOOL AFFILIATION

Charles F. Wilkinson Jr., M.D., New York

• *The plan of having regional hospitals affiliated with university medical schools has certain advantages. In the present instance, six hospitals are so affiliated; they are not limited by state lines, but by considerations of commuting distance. The teaching plan is formulated and implemented by a local educational committee made up of the directors of the hospital's departments of surgery, medicine, obstetrics and gynecology, and pathology, with the assistance of other physicians of the staff; the hospital also recruits and appoints interns and residents. The university center supplies both administrative guidance and instructional resources, with emphasis on a sound house-staff program and a minimum of lectures to large audiences. The test for success in such a plan is the continued willingness of medical schools to participate and of the regional hospitals to bear most of the expense.*

It is probably of some significance that eight years ago I presented a paper, "The Utilization of Regional Hospitals for Medical Education" [1] to this congress. Now I have been asked to discuss the potentialities of such a program. After eight years, this significance is twofold: 1. Many persons are still interested in regional hospital–medical school affiliation. 2. We still wonder what the potentialities are and, I presume, how we can measure them.

Since I have been asked to discuss the potentialities within the framework of the New York University program, perhaps I should first describe the plan, although this could be done more adequately by my friend and colleague, Dr. Clarance E. de la Chapelle. Since going to the New York University Post-Graduate Medical School, I have, on occasion, visited the regional hospitals as do other members of the professorial staff, but I have had no responsibility in the administration of the plan. Thus, my comments might be considered the "worm's-eye" view, that is, the one of the full-time professor.

Original Program

The New York University–regional hospital program, like so many of the regional programs, was made possible, at the start, by a grant from the W. K. Kellogg Foundation.[2] It has, like most of these programs, undergone a series of changes and modifications so that, in its present form, it represents a compromise between what the program director, the affiliated hospital, and the faculty believe to be ideal and what is practical. That the program exists at all today means to me that it cannot be too far from any of these three ideals.

At the start, New York University had an advantage (at least it was considered by some as such) in not being a state university, and, therefore, it could operate across state lines. I should add that here the so-called advantage ended. It did not extend to such base and mundane things as the budget or faculty salaries. The original description of the program [3] stated that it was intended that, by affiliation, the New York University College of Medicine would affiliate with selected hospitals in the suburbs, in small towns, and even in rural communities. The members of the resident staffs of the hospitals would have the privilege of spending an academic year at the medical school, during which time they would participate in basic science or graduate courses applicable to their particular field of residency. The basic science courses were taken on a part-time or a full-time basis; the graduate courses were taken full-time. No tuition was charged, but the affiliated hospital was made responsible for the candidate's maintenance, whether the institution was within commuting distance or not.

The members of the attending staffs of these hospitals, especially the younger men, had the opportunity to continue their own education by returning for ward work or continuation courses in the medical school and by the visits of faculty members to the hospitals. The hospitals cooperating in the plan fulfilled all the requirements of the American College of Surgeons and, in addition, maintained an educational program outlined by the medical school.

It was thought that the establishment of such a system of hospitals associated with a large medical center, with their teaching supervised by the medical school, would improve the quality of medical care and provide substantial broadening of the opportunities present for physicians to obtain graduate and postgraduate medical education.

In 1948, the merger of the New York University College of Medicine and the New York Post-Graduate Medical School and Hospital had been effected, and the New York University–Bellevue Medical Center was established. After this merger, the Division of Affiliated and Regional Hospitals was formed and placed, for administrative purposes, in the postgraduate medical school, but it was able to call on the faculties of both the college of medicine and the postgraduate medical school for periodic visits to the regional hospitals.

By 1949, there were 10 affiliated hospitals in four states, with a total of some 2,500 beds (fig. 1). There were salaried coordinators at each of the affiliated hospitals. These coordinators were usually young men who had just entered practice. They devoted from one-third to one-half of their time in arranging the educational program at the hospital and supervising the intern and resident training programs. As the

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requirements of their practices became more demanding, they turned their jobs over to younger men and went on to equally important, but somewhat less active positions in the program. This plan had the additional advantage of enabling desirable young men to start in a community with a small stipend that would help pay the office rent until their practices were established.

Fig. 1.–Dots show the geographical distribution of the 10 hospitals affiliated with the New York University–regional hospital plan in 1949.

Present Program

At the present time, active membership in the regional hospital plan is limited to six hospitals.[4] There are three levels of membership, designated as first, second, and third year. A faculty representative visits the hospital in the first-year group two days a week during the academic year. In the second year, visits are made weekly and in the third year biweekly. After three years of active membership, a member hospital may continue its affiliation as a "graduate" hospital. Faculty visits are then made on request.

Faculty visits are dependent upon the needs of the various departments of the member hospital. The making of a minimum number of planned presentations to large audiences is the rule. Both the major specialties and the subspecialties are represented by the visiting faculty members. No rigid schedule is followed as to the number of visits made to any department.

In order to carry out successfully the regional hospital plan, it became apparent that unanimity of agreement on the part of the member hospital staffs as to the purpose of the plan was absolutely necessary. Where there existed a misunderstanding in this regard, the regional program did not succeed to the same degree as it did where the active attending staff were unanimous in their desire for affiliation.

In the present regional hospital plan, the center makes it clear to the member hospitals that there are many and varied opportunities for mutual discussion of problems. By consultations with the administrative officers of the plan, considerable help is available to the local teaching program. For example, members of the hospital staffs may come to the medical center and draw on the academic experience of the faculty as well as attend clinics, conferences, and seminars. It is the policy of the administration of the regional hospital plan to emphasize these hitherto unused resources.

The new plan does not provide for a local coordinator. Experience gained from the old plan indicated that such a key figure in the operation of the hospital program should have some voice in making policy in the hospital. The common lack of seniority of the coordinator interfered seriously with the implementation of the policies and programs he proposed.

In the new plan, each member hospital forms a committee that is responsible for formulating and implementing a training program. This educational committee is made up of the directors of the departments of surgery, medicine, obstetrics and gynecology, and pathology, with the assistance of other physicians of the staff. One member of the committee acts as a liaison officer between the hospital and the center.

Interns and residents are recruited and appointed by the member hospital. The medical center requires, however, that the hospital be approved for intern or resident training by the Council on Medical Education and Hospitals of the American Medical Association. The medical center does not assume responsibility for the recruitment or the appointment of interns and residents, nor is it responsible for maintaining or seeking approval for intern and resident training in a member hospital. Rotation of residents between a member hospital and the center is not a part of the new program.

Fig. 2.–Dots show the geographical location of the hospitals presently affiliated (solid line) and those affiliated in the past (broken line). The one hospital indicated by a broken line and dots is Hunterdon Medical Center, Flemington, N. J., and is considered in a separate category from the others.

In order to minimize the nonproductive time consumed in travel, the geographical location of the regional hospitals participating in the new plan is limited to a radius of approximately 50 miles from the medical center.

It is obvious that the outline I have presented of the New York University–regional hospital plan has been sketchy, but it will, I believe, serve the purpose of the symposium on postgraduate medical education. Figure 2 shows what communities have had or do have hospitals participating in the plan.

Potentialities and Success of Plan

What are the potentialities of this regional hospital–medical school affiliation? How can we evaluate success or lack of it? The potentialities appear to be as great as the vision and imagination of those administering and participating in the plan. Ideally, any member hospital could eventually have superior local self-education for its staff, guided by the medical center. Because of its educational program, the hospital should be more attractive to interns and residents, and a sound house-staff program should add stature to the continuing educational program of the visiting staff. Because of an affiliation with the medical center, a hospital should have ready advice and consultation on matters ranging from diagnosis and therapy to new laboratory techniques and even hospital management. Ultimately the regional hospital would be as much a part of the medical center as any ward geographically located in the center. However, men being as they are, I do not expect perfection, but something less.

It would be helpful if one could measure this degree of success. Can this be done? To date, I know of no way to titrate these programs with any degree of accuracy. Many of us have a feeling that they are more, rather than less, successful. Members of the regional hospital staffs apparently feel that they are worthwhile and that the general level of medical practice in their hospital has been elevated.

Some of us on the faculty feel, however, that our purpose would be better served if the affiliated hospitals were kept at a constant level of participation rather than at the step-like dissociation as in the present plan.

From my own point of view, I hated to see the idea of the coordinator abandoned. It had been my experience that it was easier to work through a coordinator than through a committee, but, as I pointed out earlier, my administrative experience was in a different part of the United States, and I cannot speak with any firsthand knowledge of the administrative problems associated with the current New York University–regional hospital program. I can assure you that I have enjoyed my visits to the regional hospitals and that I have been impressed by the excellence of their training programs as well as by the standard of the medical care practiced in them.

To me, the most significant fact is that the various hospitals in the regional plan of New York University pay for 80% or more of the cost of the program. In other words, the regional hospitals want the program enough to pay their way. On the side of the medical school, there is still enthusiasm on the part of some of us on the faculty and resigned acquiescence on the part of others, although I know of no active opposition.

It would appear then, that, while not perfect, the New York University–regional hospital plan is here to stay. It will, undoubtedly, undergo other modifications in the future and may some day come even closer to the ideal of the medical center as an integral and vital part of the region it serves.

550 First Ave. (16).

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Acute Nephritis.—When clinically apparent the mode of presentation in acute nephritis is extremely variable. The onset may be sudden or insidious, and may accompany, or follow after an interval the signs of an acute infection in some other part of the body, usually a hæmolytic streptococcal infection in the upper respiratory tract. Broadly speaking the onset tends to be abrupt in children, and the signs of nephritis are then apt to be intermingled with, or even over-shadowed by those of the primary infection. In adults the so-called latent interval is often longer, and apart from initial malaise, the early signs of nephritis may be confined to urinary changes which, however, may be quite marked. But both in children and in adults acute nephritis may be ushered in by any one, or any combination of its cardinal features—bloody and scanty urine, with or without frequency, urgency, lumbar aching and pain, and, in children, abdominal pain and vomiting—œdema, especially, and almost invariably, puffiness of the eyelids and face on waking in the morning, and, in those who remain ambulant, swelling of the feet and ankles—cardiovascular signs such as headache, vomiting, convulsions and coma. In cases of war nephritis dyspnœa was a very common presenting symptom though then rarely met with in civilians. My impression is that dyspnœa is now more frequently seen as a presenting sign in civilians. Unquestionably hæmaturia and œdema are the two most striking and common initial clinical signs in acute nephritis and it is of interest to note that over the years their relative prominence as presenting features has apparently been reversed.—A. A. Osman, F.R.C.P., Acute Nephritis, *The British Journal of Clinical Practice*, September, 1956.

ESSENTIALS OF A RESIDENCY IN GENERAL PRACTICE

C. Wesley Eisele, M.D., Denver

• *There is evidence of a distinct upsurge of interest in the practice of general medicine. In the whole nation, 64% of all physicians in private practice are either general practitioners or part-time specialists. To satisfy the increasing demand for advanced training in general practice, more and better residencies in this field must be offered. Such a residency should be a minimum of two years, must be equivalent in standards and prestige to a specialty residency, and must be primarily of educational value to the resident rather than a service to the hospital.*

A growing interest in the training of young physicians for general practice has become apparent in many quarters, and a panel on this subject at the annual meeting of the Advisory Board for Medical Specialties is particularly significant and heartening. This increasing interest seems to parallel a renewed conviction that the position of the general practitioner in American medicine is secure.

An organized general practice residency has been offered at the University of Colorado School of Medicine since 1948. Material for this paper has been drawn from experience with this program, experience that was recently crystallized by an analysis of questionnaires returned by former residents. The annual reports of the Council on Medical Education and Hospitals of the American Medical Association, publications of the Bureau of Medical Economic Research of the American Medical Association, and brochures from many general practice residency programs have also been freely used.

A decade or so ago, there was a common belief that advances in knowledge and in technical developments would soon make the general practice of medicine untenable and it would become a relic of the past; but the expected demise of the general practitioner has not come to pass. On the contrary, a distinct upsurge of interest in this type of practice may be observed among superior young physicians. There continue to be more general practitioners in the United States than the total of all specialists combined, and there are more young physicians in general practice than in all the specialties combined. The American Academy of General Practice, although one of the youngest medical societies, is larger than any national specialty society. And a sizable proportion of the current generation of medical graduates continues to choose general practice in preference to a specialty. Tables 1, 2, and 3 present data in support of these statements.

The studies of Dickinson[1] and the Bureau of Medical Economic Research of the American Medical Association (table 1) show that general practitioners constitute the great majority of physicians in active private practice (72%) in cities with populations of 10,000 or less (12,829 communities). An additional 17% classify themselves as part-time specialists—physicians who are usually more closely akin to the general practitioner than to the full-time specialist. Even in cities with populations of 100,000 or more, 40% of the physicians are general practitioners and an additional 12% are part-time specialists. In the whole nation, 64% of all physicians in active private practice are either general practitioners or part-time specialists. The age distribution of physicians in active private practice (table 2) indicates that general practitioners as a group are significantly younger than either full-time or part-time specialists.

Current generations of senior medical students continue to display an interest in general practice, if one may judge by the choice of careers expressed by 552 internship applicants at the University of Colorado Medical Center Hospitals for 1955 and 1956 (table 3). The 522 senior students were drawn from 65 medical schools in the United States and Canada, and represented about 4% of all the graduates of American medical schools for these two years. The students who expressed a definite or probable preference for general practice greatly outnumbered those choosing any specialty. These applicants, however, may not represent a true cross section of American senior medical students, because the data may be distorted by being weighted with students preparing for general practice who apply here because of geographical characteristics of Colorado or because of the pioneering efforts of the University of Colorado in providing general practice residency training. Nevertheless, these data suggest that interest in general practice is far from dead among today's medical students.

There can be little doubt that the general practitioner is here to stay, but his role is changing and will continue to change. The prototype of the modern general practitioner is a highly educated, astute young physician, skilled in broad areas of practice, and particularly skilled in human relations, with an unusual ability to handle people. He is motivated by a sincere interest in mankind and the ailments that afflict it. Residency training of high quality is just as essential to him as it is to any specialist.

Opportunities for Residency Training

The type of residency offered the prospective general practitioner in the past usually consisted of either a patchwork of unorganized leftovers from specialty residencies or an extension of a rotating internship. Many physicians preparing for general practice therefore elected to take one or more years of residency in one or more specialties, and this plan continues to be a frequent choice even today. It leaves obvious gaps in their training, with little or no educational exposure to important areas of their future practice. Furthermore,

From the University of Colorado School of Medicine.

Read before the Advisory Board for Medical Specialties at the 52nd Annual Congress on Medical Education and Licensure, Chicago, Feb. 12, 1956.

the first year of a specialty residency seldom provides a well-rounded experience or a basic background even for that specialty, and it is only natural for a specialty service to give preference in appointments and assignments to those residents indicating their intention of completing the entire program.

The development of the general practice residency may be traced in the Annual Reports on Internships and Residencies by the Council on Medical Education and Hospitals of the American Medical Association. A "Mixed Residency" was listed in the years prior to 1948. This title was changed to "General Residency" in the 1948 and 1949 reports. These categories carried the following footnote: "Mixed residencies represent general hospital experience of at least one-year duration following an approved internship. All hospitals approved for intern training are also certified for general or mixed residencies." It appears that these training programs were without definite educational standards and were essentially nothing more than a continuation of the internship for an additional year.

The 1950 annual report listed "General Practice Residencies" for the first time, and hospitals desiring programs under this category had to meet certain requirements. The report listed 32 programs, which provided 92 positions, accounting for less than 0.5% of the 19,364 approved residency positions of all types. These numbers have slowly increased, and in 1955 there were 155 approved programs, offering 614 positions, still only a little more than 2% of the now 25,486 approved residency positions of all types. The growth of residency positions in the United States over the past 20 years is shown in the figure, which clearly demonstrates the lag in growth and the obvious inadequacy in the number of general practice residencies available.

TABLE 1.—*Physicians in Active Private Practice in the United States April, 1950—Distribution by Size of Community**

	General Practitioners	Part-Time Specialists	Full-Time Specialists	Total
Cities with population of 10,000 or less (12,829 communities)				
No. of physicians in active private practice	26,761	6,155	4,245	37,161
% of all physicians in communities	72	17	11	100
% of all physicians in type of practice	35	27	7	...
Cities with population of 100,000 or more (107 communities)				
No. of physicians in active private practice	29,729	8,869	35,288	73,886
% of all physicians in communities	40	12	48	100
% of all physicians in type of practice	39	38	62	...
Total physicians in private practice in the United States	76,158	23,261	57,035	156,454
% of total physicians	49	15	36	100

* Data from Dickinson.[1]

While the number of general practice residencies is clearly inadequate, the educational standards of those which do exist require critical reexamination, for there are many indications that all is not well. Perhaps the most serious indictment is that great numbers of prospective general practitioners continue to seek fragments of specialty residencies in preference to the general practice residency opportunities now available. This is attested to by the fact that only 66% of the meager number of approved general practice residency positions were filled for the year 1954-1955,[3] and many of those which were filled were occupied by foreign physicians. In July, 1953, 38% of all general practice residents serving in approved programs were aliens. This compares with 21% in approved residencies of all types, and is surpassed only by the 41% in pulmonary disease residencies.[3] In the year 1955-1956, 4,174 foreign physicians were reported to be in residency training in United States hospitals in 35 different specialties. The number in general medicine was surpassed only by those in general surgery.[4]

TABLE 2.—*Physicians in Active Private Practice in the United States April, 1950—Distribution by Age of Physicians**

	General Practitioners	Part-Time Specialists	Full-Time Specialists
Median age, yr	45.5	49.0	47.2
Age groups with the greatest number	30-39	40-49	35-44
Cumulatively			
% under 35	20	5	5
% under 40	35	16	22
% under 45	47	35	41
% under 50	56	51	56

* Data from Dickinson.[1]

In some instances general practice residencies are offered by hospitals which are having difficulty securing interns, and one cannot help wondering whether the primary motivation may be to provide intern services. The stipends paid general practice residents tend to be higher than those paid most specialty residents. A median stipend of $250 per month is offered by the 155 approved general practice residencies listed in the 1955 report of the Council on Medical Education and Hospitals, and almost one-third of these hospitals offer stipends ranging from $300 to as high as $500 per month. As in the case of internships, one may justly suspect that excessively high stipends may indicate a greater interest in the service aspects of the internship or residency than in the education aspects.

From these considerations, one may be quite certain that the number of general practice residencies is far too small, and one may well entertain concern that many are deficient in planned educational experience. The opportunities for developing really superior training programs for general practice are unlimited.

Role of Surgery in General Practice

An intelligent definition of the requisites of a general practice residency can not be formulated until one has a clear picture of the role of the general practitioner. On this, there is no meeting of the minds, and there are almost as many opinions as there are specialists. Judging by staff regulations in a growing list of hospitals, each specialty appears reluctant to assign significant segments of its "empire" to the realm of general practice, but willingly relinquishes its unwanted chores. At the same time, specialists seem to have no hesitancy in appropriating functions of the general practitioner. It has been said in jest that a surgeon is a general practitioner who does not deliver babies and an internist is a general practitioner without benefit of surgical fees.

There are many areas of controversy over the role of the general practitioner, but the hub of the conflict revolves around the practice of surgery. How much surgery, if any, should be performed by the general practitioner? And therefore, how much surgery, if any, should be taught to the general practice resident? If

TABLE 3.—*Choice of Fields of Practice by Internship Applicants at University of Colorado Medical Center Hospitals for Two Years Beginning July 1, 1955, and 1956**

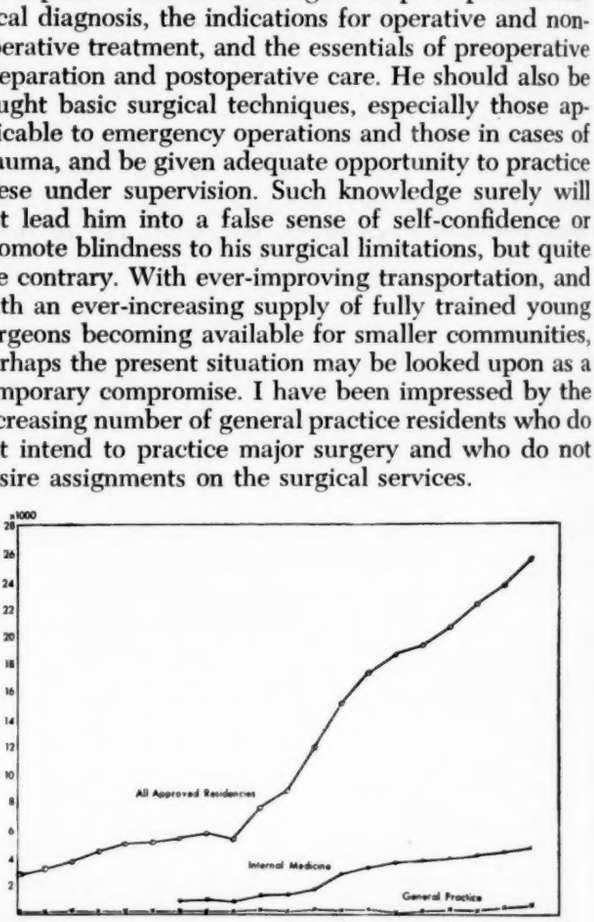
Field	Definite Choice (298 [54%])		Possible or Probable Choice (188 [34%])	
	No.	%	No.	%
General practice	108	36.0	90	26.0
Surgery	57	19.0	67	20.0
Internal medicine	56	19.0	73	21.0
Pediatrics	23	8.0	45	13.0
Obstetrics-gynecology	23	8.0	31	9.0
Orthopedics	10	3.0	2	0.6
Psychiatry	9	3.0	11	3.0
Pathology	4	1.4	5	1.5
Radiology	4	1.4	2	0.6
Ophthalmology	2	0.7	3	1.0
Anesthesiology	1	0.3	3	1.0
Urology	1	0.3	3	1.0
Neurology	...	...	2	0.6
Dermatology	...	...	1	0.3
Ear, nose, and throat	...	...	1	0.3
Industrial medicine	...	...	1	0.3
Medical statistics	...	...	1	0.3
Totals	298	100	341	100

* 552 applicants from 65 medical schools in U. S. and Canada; 66 (12%) expressed no choice.

four or five years of residency are required to adequately train a general surgeon, then how can we hope to cram enough of the essentials of surgery into a three-month, or a six-month, or even a full-year surgical assignment? Is it not better to teach the general practice resident no surgery at all rather than a modicum, because a little knowledge may be a dangerous thing? Is there not a real danger that a brief assignment on a surgical service may serve only to give the resident an inflated sense of self-confidence and leave him without a proper recognition of his own limitations?

Conversely, suppose you or I should become the victim of an auto accident in an isolated area, a hundred miles or more from the nearest board-qualified surgeon. Would we not be most grateful if the general practitioner who must patch us up has had even a brief period of residency training in surgery? It is not within the scope of this paper to debate the merits or the evils of the practice of surgery by general practitioners. But, whether we like it or not, in many areas of this country a large portion of general surgery continues to be performed by general practitioners, and in some states their work accounts for as much as 70% of all the general surgery. General practitioners will continue to perform operations even without the benefit of residency training, albeit probably less ably. It has long been a common practice, and one which still persists, for the general practitioner to obtain his surgical education through "on-the-job" training, assisting older general practitioners at operations and receiving more or less supervision from them on their own cases. While at times this may be a satisfactory experience, I fear that, on the average, the method tends to perpetuate all the faulty surgical techniques and obsolete operations from one generation of general practitioners to another. The method is especially deficient in instilling into the neophyte a sound knowledge of the proper indications for surgery or, more correctly, a knowledge of when not to operate.

Completely satisfactory answers to these questions are not at hand. It is clear, however, that the objective of a general practice residency should not be to train young physicians to compete for major surgical privileges in areas where fully trained surgeons are readily available, nor should it ever be used as a training shortcut for a frustrated would-be surgeon. These concepts are only common sense, and are in the best interest of the patient's welfare. But is it not equally clear, also in the interest of patient welfare, that surgery must be taught to those general practice residents who will be required, in an isolated area, to perform operations in cases of trauma or in emergencies? In my opinion, the general practice resident preparing for rural practice should be taught the principles of surgical diagnosis, the indications for operative and nonoperative treatment, and the essentials of preoperative preparation and postoperative care. He should also be taught basic surgical techniques, especially those applicable to emergency operations and those in cases of trauma, and be given adequate opportunity to practice these under supervision. Such knowledge surely will not lead him into a false sense of self-confidence or promote blindness to his surgical limitations, but quite the contrary. With ever-improving transportation, and with an ever-increasing supply of fully trained young surgeons becoming available for smaller communities, perhaps the present situation may be looked upon as a temporary compromise. I have been impressed by the increasing number of general practice residents who do not intend to practice major surgery and who do not desire assignments on the surgical services.



Growth of number of residency positions in approved programs in United States.

University of Colorado General Practice Residency

Original Program.—When the general practice residency was organized at the University of Colorado School of Medicine in 1948, it was the aim of the faculty to make it equivalent in educational content and training opportunities to a specialty residency in a university teaching hospital. The general practice resident, along with all others, was required to register

each quarter in the clinical division of the graduate school of the University of Colorado. (This requirement has now been made optional for all residents of the medical center.) While accumulated experience has changed some of the concepts of the requirements, the primary objective has been maintained. Originally, the faculty was of the opinion that a three-year residency was necessary to adequately prepare a young physician to enter general practice. While this may still be true, it was learned that it is not realistic, for only 4 of 88 residents completed the full three years. A regular rotation of services was designed to give broad experience in the major fields of clinical practice, but this was never fully implemented because the program departed from a rigid schedule and became highly flexible as to both duration and content. Schedules were individually tailored in an attempt to meet the needs and desires of each resident. Superficially this seemed to be an ideal plan, and it is in agreement with the recommendations of "The Essentials of a General Practice Residency."[5] But serious disadvantages soon became evident. This plan assumed unjustifiably that a young and inexperienced physician was in a position to know precisely what he required for practice. The fallacy was disclosed by the frequency with which residents asked to change their schedules. All too often, a resident would end up with an unbalanced program that was notably deficient in training for important segments of his future practice. Because only a limited number of positions were available on several key services which were in greatest demand, favoring the needs and desires of some residents to the detriment of others could not be avoided. After years of struggling with individualized programs, it seemed that one could never arrange a schedule that perfectly honored the needs of all. It may be noted that approved specialty residencies do not offer such wide freedom of choice in assignments, nor is it deemed desirable.

Revised Program.—A comprehensive revision of the general practice residency at the University of Colorado became effective July 1, 1956. In its formulation, several concepts were believed to be important:

1. The program should be one of graduate education having standards equivalent to those of a university hospital specialty residency.

2. Two years is the minimal period of training in which a well-rounded and reasonably complete rotation can be accomplished through those clinical fields of greatest importance in general practice. An optional third year is desirable for those wishing optimal training.

3. General practice residents fall into two classes; those preparing for practice in rural or isolated communities and those preparing for a family-type practice in larger communities where adequate specialty consultation is available. Two different programs to prepare for these two types of practice should satisfy the needs of the great majority of residents.

4. Rather than flexible or individualized schedules, regular rotation of services should be arranged to insure a well-balanced and reasonably complete educational experience.

5. Assignment to a clinical service should be for a long enough period for the resident to become adequately oriented to the field and its problems. Three months is considered to be the minimal acceptable assignment, except for a limited number of subspecialty electives.

The revised two-year program offers a choice of two types of training. During the first year, the schedule of services is the same for all residents. In addition to three-month assignments on the medical wards and on the pediatric service, there are two assignments which are especially designed for general practice residents. In the general medical clinic, each resident serves for a period of three months. Here he practices comprehensive medicine on his own patients and families, under the supervision of a full-time and volunteer faculty with special interest in this type of medicine. The resident has an opportunity to follow his patients for prolonged periods by returning to the clinic one day or two half-days weekly during subsequent assignments. While assigned to this clinic, the resident also works on the emergency room service.

The other special assignment consists of three months spent in one of the affiliated small community hospitals staffed primarily by general practitioners. Here the resident participates in small hospital practice away from a teaching medical center and in the kind of environment where he will eventually practice. This experience provides insight into many of the problems that occur in small hospitals as well as the practical problems of medical economics and sociology. Visits to practitioners' offices in the community provide opportunities to observe and discuss equipment requirements, bookkeeping and record systems, and other essentials of practice.

In the second year, the resident is offered a choice of either a "medical" or a "surgical" year. In the "medical" year, six months are divided between the psychosomatic medicine service and the medical outpatient clinics, including a variety of medical subspecialty clinics. Combining these services seems more desirable than giving two three-month; full-time assignments, for it permits the resident to follow his patients over longer periods of time. The remainder of the year is devoted to obstetrics (three months) and to electives (three months). There may be a second three months of pediatrics for those with a special interest in this field.

The second-year "surgical" program includes a three-month assignment on an active orthopedic and fracture service which affords both hospital and outpatient experience. Six months are devoted to general surgery, the time being divided between the surgical service of the university medical center hospitals and an affiliated surgical service at the Bernalillo County-Indian Hospital at Albuquerque, N. Mex. This hospital service was selected because of an unusual wealth of clinical material and an exceptional opportunity for resident responsibility combined with adequate teaching supervision. This is provided by a capable attending staff and two advanced surgical residents rotating from a Veterans Administration hospital. These services emphasize experience in emergency surgery and that after trauma as well as common elective operations. A three-

month assignment on the obstetrics and gynecology service at the Bernalillo County-Indian Hospital completes the second year. An individualized elective third year of residency is available for those desiring optimal training.

Comment

Twelve statements may be made which summarize my conception of the essentials of a general practice residency:

1. The general practice residency should be equivalent in educational standards and training opportunities to a specialty residency.

2. The assignment of a resident to any service should be primarily for the educational value rather than for service considerations.

3. Two years is the minimal time in which an adequate rotation can be accomplished through the clinical services which are of major importance in general practice.

4. Assignment to a clinical service should be long enough to ensure an adequate orientation to the problems of the field. Assignments should rarely be for less than three months, with the exception of a minimal number of subspecialty electives.

5. The general practice resident should have opportunities for patient responsibility commensurate with his ability, and in general such responsibility should be equivalent to that of a first-year specialty resident.

6. Experience in the management of ambulatory patients should be emphasized. The resident should have an opportunity to develop rapport with his own patients and to follow them over a prolonged period, extending through the time he is assigned to various services. Throughout the ambulatory patient experience, the resident should have easy access to an interested and competent staff for discussion, consultation, and guidance in clinical problems.

7. Primary teaching responsibilities are best assumed by the specialist staff of the service to which a general practice resident is assigned. It is believed that the specialist is best able to transmit an organized body of specialized knowledge and skills, but it is essential that he have a sympathetic attitude toward the general practice resident and a recognition of his special problems.

8. If the staff of a hospital offering a general practice residency does not have an active organized general practice section, then a short affiliation should be arranged in a hospital which is staffed primarily by general practitioners, preferably in a small community hospital in a rural area.

9. Two different programs of two years' duration should be offered to meet the needs of two classes of residents, those preparing for practice in an isolated community and those preparing for a family-type practice in larger communities where specialty consultation is available. These should replace schedules which are flexible as to duration and content, and regular rotations of services should be provided which ensure a well-balanced and reasonably complete educational experience.

10. If surgical training is offered, it should occupy all or most of an entire year and should be designed to specifically prepare the resident to cope with traumatic and emergency situations. Surgical diagnosis, surgical principles, and minor surgery should be stressed. Time spent in the operating room should be devoted to assisting with and performing common emergency and elective procedures rather than assisting with advanced, highly specialized operations.

11. The general practice residency must be conducted in a sympathetic atmosphere, one which offers the resident a dignity and prestige equal to that of the specialty residents.

12. Finally, the general practice residency should engender good attitudes and high ideals as well as skills, and should make the resident proud to be in his chosen field. The resident should be stimulated to become a lifetime student, so that, after 20 years of practice, he can truly say that he has had 20 years of experience, not one year's experience 20 times.

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Monocytic Leukemia.—Two varieties of monocytic leukemia are generally recognized. In one (Schilling type), the leukemic cells are believed to arise from the reticuloendothelial system, because of which the terms "reticulosis," "leukemic reticuloendotheliosis," and "histiocytic leukemia" are often applied. In the other form (Naegeli type), the cells are thought to arise from primitive cells in the bone marrow (monoblasts, myeloblasts). In the Schilling type there have been difficulties in distinguishing leukemia and aleukemic neoplasias from non-neoplastic hyperplasias; in the Naegeli type, monocytic and myeloid leukemias are not always clearly distinguished from each other. The clinical, hematologic, and pathologic features of these two types have been described in detail. Nevertheless, there continues to be uncertainty regarding the frequency and extent of reticuloendothelian participation.—M. N. Richter, M.D., Origin of Leukemic Cells in Monocytic Leukemia, *Laboratory Investigation,* March-April, 1956.

EFFECTS OF CYCLOPROPANE ANESTHESIA ON THE CIRCULATION OF HUMAN BEINGS

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• *Seven patients, while under various electroencephalographic levels of cyclopropane anesthesia, were studied in relation to hemodynamics. Measurements included cardiac index, pulse rate, stroke volume, peripheral resistance of the circulatory system, and central, arterial, and venous pressures. The various levels of anesthesia caused changes in most of the measurable factors, but all alterations returned to preanesthetic levels as the anesthetic was withdrawn.*

Investigations of hemodynamics during anesthesia with cyclopropane have been carried out in man and in animals. Evidence has been presented in these publications demonstrating both increased and decreased cardiac output.[1] The study described herein was undertaken to correlate cardiac output, level of arterial blood pressure, peripheral resistance, and central venous pressure with depth and duration of anesthesia with cyclopropane in man.

Method

Seven surgical patients with no discernible cardiovascular or pulmonary disease were studied (table 1). Each patient was in the supine position throughout the period of observation. In each patient loss of blood was minimal, and in no instance was a vasopressor agent used. Respirations were assisted in all but one patient.

A needle was inserted into the radial artery and connected with a cuvette oximeter [2] and strain-gauge manometer.[3] A cardiac catheter was passed centrally through an arm vein until its tip lay in the region of the superior vena cava. This catheter was connected to a strain-gauge manometer. Another strain-gauge manometer was connected to the airway assembly. An earpiece oximeter [2b] was placed. Electrocardiographic electrodes were secured to the right and left arms and the left leg. Electroencephalographic scalp electrodes were inserted in the skin over the frontal and occipital regions. Thus, the following variables were recorded continuously: blood pressure in the radial artery, central venous pressure, pressure in the airway, oxygen saturation of arterial blood, heart rate and rhythm, and the depth of anesthesia.[4]

At predetermined periods, arterial dye-dilution curves were recorded simultaneously at the radial artery and the ear, and samples of arterial blood were withdrawn to determine the pH. The dye solution in a volume of 1 or 2 cc. was injected as rapidly as possible via the catheter into the superior vena cava. The average dose of Evans' blue dye (T-1824) for each curve was 10 mg. The first dye-dilution curve was recorded while the patient was conscious and breathing pure oxygen 30 minutes after the intravenous administration of 10 mg. of morphine sulfate and 0.4 mg. of atropine sulfate. Anesthesia with cyclopropane and oxygen was then induced. The second dye-dilution curve was recorded when the patient had attained a light level of anesthesia, electroencephalographic level 2. Sufficient dimethyl tubocurarine (Metubine) iodide was given intravenously to facilitate tracheal intubation during light anesthesia. The third dye curve was recorded after intubation and during light anesthesia. Deep anesthesia, or anesthesia of electroencephalographic level 4, was induced, and a fourth dye-dilution curve was recorded. The patient was permitted to return to a light level of anesthesia, and a fifth dye curve was recorded.

TABLE 1.—*Data on Seven Patients Studied While Under Cyclopropane Anesthesia*•

Case No.	Age, Yr.	Sex	Weight, Lb.	Body Surface, Sq. M.
1	49	M	159	1.86
2	43	F	140	1.64
3	48	M	185	1.98
4	53	M	173	1.85
5	40	F	152	1.71
6	53	F	132	1.65
7	65	F	185	1.90

• All patients underwent cholecystectomy.

From the arterial dye-dilution curves, cardiac output was calculated by the conventional Hamilton method.[5] Stroke volume, peripheral resistance, and central blood volume were calculated also.

Results

Cardiac Index.—The cardiac index values are shown in table 2 and figure 1. The mean cardiac index of all conscious patients breathing pure oxygen was 4.2 liters per minute per square meter of body surface, with a range of from 3.2 to 6.5 liters. The cardiac index decreased in all patients in anesthesia of electroencephalographic level 2 before intubation to a mean of 3.0 liters per minute per square meter, with a range of from 2.3 to 4.2 liters. After intubation the mean cardiac index was 3.8 liters per minute per square meter, with a range of from 2.8 to 5.2 liters. When anesthesia was deepened to electroencephalographic level 4, the cardiac index decreased in all

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patients from that during intubation and in four patients from that at level 2 before intubation; the mean cardiac index at level 4 anesthesia was 2.5 liters, with a range of from 1.8 to 3.2 liters. With return to anesthesia of electroencephalographic level 2, the cardiac index in all patients increased; the mean cardiac index was 3.4 liters per minute per square meter, with a range of from 2.1 to 5.3 liters.

Pulse Rate.—The pulse rates are shown in table 2 and figure 1. The mean pulse rate of all conscious patients was 92 beats per minute, with a range of from 69 to 120 beats. The heart rate of all patients but one decreased in anesthesia of electroencephalographic level 2 before intubation to a mean pulse rate of 74 beats per minute, with a range of from 51 to 102 beats. After intubation, the mean pulse rate was 87, with a range of from 60 to 100 beats. A decrease in pulse rate was found in all patients in anesthesia of electroencephalographic level 4; the mean pulse rate was 66, with a range of from 48 to 82 beats. An increase in pulse rate was found on return to electrocardiographic level 2; the mean pulse rate was 80, with a range of from 60 to 102 beats.

Stroke Volume.—The stroke volumes are shown in table 2 and figure 1. The mean stroke volume of all conscious patients was 43 cc. per heart beat per square meter of body surface, with a range of from 36 to 50 cc. The mean stroke volume in anesthesia of electroencephalographic level 2 before intubation was 41 cc. per beat per square meter, with a range of from 35 to 50 cc. The stroke volume in one patient increased by 13 cc. after intubation. When anesthesia was deepened to electroencephalographic level 4, the stroke volume decreased in all but two patients in whom no changes were noted. The mean stroke volume was 37 cc. per beat per square meter, with a range of from 30 to 40 cc. With return to anesthesia of electroencephalographic level 2, stroke volume increased in all but one patient in whom it decreased by 2 cc. The mean stroke volume was 42 cc. per beat per square meter, with a range of from 31 to 55 cc.

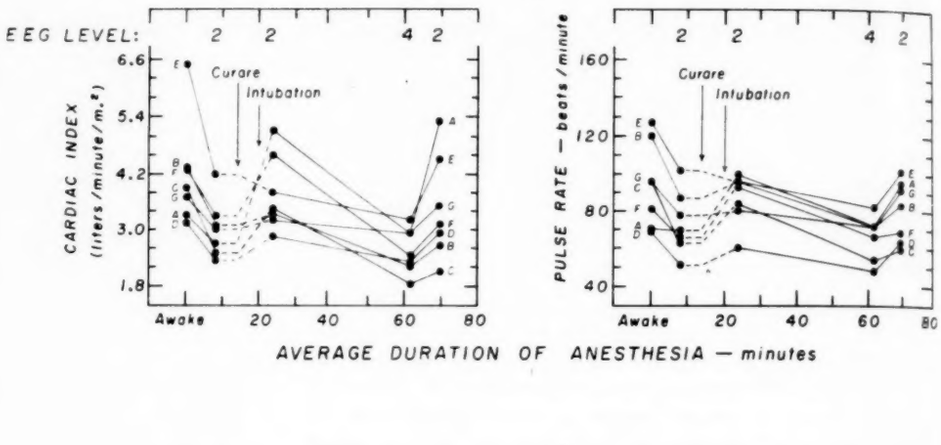

Fig. 1.—Graphs showing changes in cardiac index, pulse rate, stroke volume, and mean pressure in radial artery during cyclopropane anesthesia. Letters A to G represent cases 1 to 7 as listed in tables. Solid dots represent average time at which observations were made, and values for individual patients are connected. Broken line represents average time taken to administer curare and intubate patient. Cardiac index and pulse rate parallel each other closely with significant decrease in light anesthesia (electroencephalographic level 2) and further decrease in deep anesthesia (electroencephalographic level 4) and return toward values when awake on lightening level of anesthesia.

Peripheral Arterial Blood Pressure.—The mean pressure in the radial artery of all conscious patients was 94 mm. Hg. Before intubation in all patients under anesthesia of electroencephalographic level 2, it increased to 109 mm. Hg, with a range of from 94 to 135 mm. Hg (table 3, fig. 1). After intubation, the

TABLE 2.—*Cardiac Index, Stroke Volume, and Pulse Rate in Seven Patients at Various Electroencephalographic Levels of Cyclopropane Anesthesia*

	Depth of Anesthesia																			
				Level 2																
	Awake			Before Intubation				After Intubation				Level 4				Level 2				
Case No.	Cardiac Index*	Pulse Rate†	Stroke Volume‡	Time§	Cardiac Index*	Pulse Rate†	Stroke Volume‡	Time§	Cardiac Index*	Pulse Rate†	Stroke Volume‡	Time§	Cardiac Index*	Pulse Rate†	Stroke Volume‡	Time§	Cardiac Index*	Pulse Rate†	Stroke Volume‡	
1	3.3	70	47	15	2.7	70	38	12	5.2	100	51	46	2.9	72	40	7	5.3	96	55	
2	4.4	120	36	11	3.1	87	35	11	3.3	96	35	45	2.2	72	30	6	2.6	84	31	
3	3.9	96	41	6	2.5	63	40	17	3.5	84	41	50	1.8	54	34	7	2.1	60	35	
4	3.2	69	45	7	2.3	51	45	17	2.8	60	47	45	2.3	48	39	10	2.9	64	46	
5	6.5	112	49	7	4.2	102	40	19	3.8	96	40	45	3.2	82	40	8	4.5	102	44	
6	4.3	81	50	4	3.3	66	50	17	4.6	93	49	22	2.4	66	40	8	3.1	64	45	
7	3.7	96	38	7	3.0	78	38	17	3.2	80	40	13	2.9	72	40	10	3.5	92	38	

* Expressed as liters per minute per square meter of body surface.
† Expressed as beats per minute.
‡ Expressed as cubic centimeters per beat per square meter of body surface.
§ Minutes after preceding observation.

mean arterial blood pressure level was 113 mm. Hg, with a range of from 100 to 140 mm. Hg. When the patient was under deep anesthesia, electroencephalographic level 4, it was decreased in all but one patient, the mean arterial pressure being 103 mm. Hg, with a range of from 73 to 122. With return to anesthesia of electroencephalographic level 2, the blood pressure level of each patient increased; the mean arterial pressure was 112 mm. Hg, with a range of from 102 to 123 mm. Hg.

Peripheral Resistance.—The peripheral resistance values are shown in table 3 and figure 2. The mean peripheral resistance in the patients studied while conscious was 1,052 dynes seconds/centimeter,[5] with a range of from 520 to 1,288. An increase in peripheral resistance was found in all patients in anesthesia of electroencephalographic level 2 before intubation; the mean peripheral resistance was 1,650 dynes seconds/centimeter [5] with a range of from 1,039 to 2,133. After intubation the mean peripheral resistance was 1,420 dynes seconds/centimeter,[5] with a range of from 866 to 1,942. The peripheral resistance increased in all but two patients while in a deep level of anesthesia; the mean peripheral resistance was 1,910 dynes seconds/centimeter,[5] with a range of from 1,422 to 2,701. On return to a light level of anesthesia, peripheral resistance decreased in all but one patient; the mean peripheral resistance was 1,590 dynes seconds/centimeter,[5] with a range of from 960 to 2,265.

TABLE 3.—*Levels of Peripheral Resistance and Mean Arterial Blood Pressure in Seven Patients at Various Electroencephalographic Levels of Cyclopropane Anesthesia*

	Depth of Anesthesia													
			Level 2											
	Awake		Before Intubation			After Intubation			Level 4			Level 2		
Case No.	Peripheral Resistance, Dynes Sec./Cm.[5]	Blood Pressure, Mm. Hg	Time, Min.*	Peripheral Resistance, Dynes Sec./Cm.[5]	Blood Pressure, Mm. Hg	Time, Min.*	Peripheral Resistance, Dynes Sec./Cm.[5]	Blood Pressure, Mm. Hg	Time, Min.*	Peripheral Resistance, Dynes Sec./Cm.[5]	Blood Pressure, Mm. Hg	Time, Min.*	Peripheral Resistance, Dynes Sec./Cm.[5]	Blood Pressure, Mm. Hg
1	1,190	92	15	1,722	114	12	866	102	46	1,546	106	7	960	119
2	1,288	115	11	2,133	135	11	1,942	133	45	2,701	122	6	2,265	123
3	1,028	100	6	1,970	122	17	1,628	140	50	2,591	118	7	2,365	123
4	1,191	87	7	1,782	97	17	1,534	100	45	1,366	73	10	1,494	102
5	520	74	7	1,039	94	19	1,230	102	45	1,542	100	8	1,078	104
6	1,103	98	4	1,478	102	17	1,239	108	22	2,238	107	8	1,678	110
7	1,047	92	7	1,430	102	17	1,486	110	13	1,422	100	10	1,287	106

* After preceding observation.

TABLE 4.—*Central Venous Pressure in Seven Patients at Various Electroencephalographic Levels of Cyclopropane Anesthesia*

	Depth of Anesthesia								
		Level 2							
		Before Intubation		After Intubation		Level 4		Level 2	
Case No.	Central Venous Pressure When Awake, Mm. Hg	Time Min.*	Central Venous Pressure, Mm. Hg	Time, Min.*	Central Venous Pressure, Mm. Hg	Time, Min.*	Central Venous Pressure, Mm. Hg	Time, Min.*	Central Venous Pressure, Mm. Hg
1	3	15	9	12	5	46	9	7	5
2	7	11	11	11	10	45	10	6	8
3	9	6	6	17	7	50	4	7	4
4	6	7	10	17	8	45	9	10	6
5	12	7	13	19	13	45	15	8	11
6	8	4	10	17	11	22	8	8	9
7	3	7	11	17	11	13	10	10	4

* After preceding observation.

13 mm Hg. In deep anesthesia no significant increase was evident; the mean pressure was 9 mm. Hg, with a range of from 4 to 15 mm. Hg. On return to a light level of anesthesia a significant decrease in central venous pressure was evident; the mean pressure was 7 mm. Hg, with a range of from 4 to 11 mm. Hg.

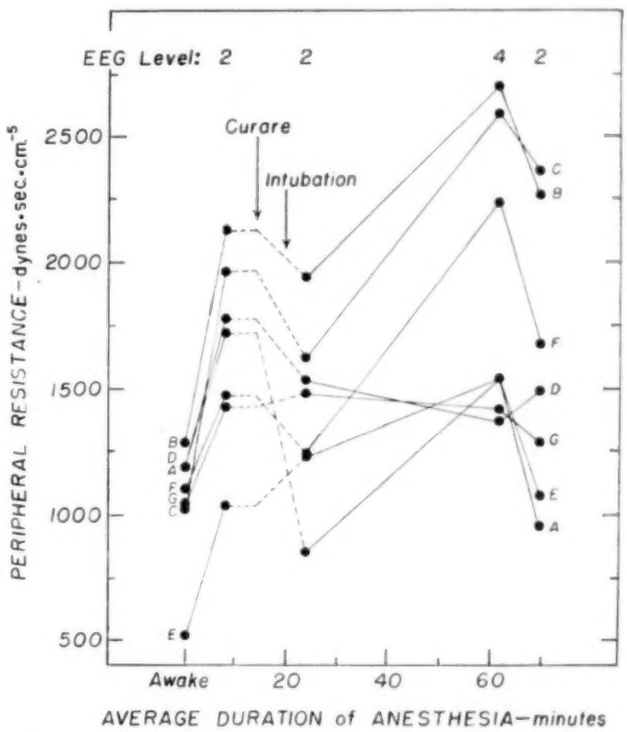

Fig. 2.—Graph showing changes in peripheral resistance during cyclopropane anesthesia. Peripheral resistance increased significantly at all levels of anesthesia. Increase in peripheral resistance varies directly with depth of anesthesia. Letters A to G represent cases 1 to 7 as listed in tables.

Central Venous Pressure.—The mean central venous pressure of all conscious patients was 7 mm. Hg, with a range of from 3 to 12 mm. Hg (table 4). A significant increase in central venous pressure was found while the patient was in a light level of anesthesia; the mean pressure was 10 mm. Hg, with a range of from 5 to

pH of Arterial Blood.—The mean pH of arterial blood was 7.34, with a range of from 7.13 to 7.50. In only one patient was a marked change in pH noted,

and this was noted during deep anesthesia when the pH fell to 7.13. The lowest pH noted among all other patients was 7.23.

Electrocardiographic Changes.—Electrocardiographic changes were observed in one patient. This change consisted of a bigeminal type of pulse, observed during a deep level of anesthesia and disappearing on lightening of the level of anesthesia.

Arterial Oxygen Saturation.—All patients during this study were receiving 50% oxygen or more, and the arterial oxygen saturation ranged from 93 to 100%. There was no correlation between changes in arterial oxygen saturation and depth of anesthesia.

Central Blood Volume.—The average central blood volume before the induction of anesthesia was 1.5 liters per minute, with a range of from 0.92 to 2.1 liters. There were no significant systematic changes in central blood volume with varying depths of anesthesia (table 5). Significant increases in mean circulation time of the dye [1e] were obtained during a light level of anesthesia, with no significant change in mean circulation time in deep anesthesia. On emergence from deep anesthesia a significant decrease was noted. Thus the mean circulation time reflected changes in cardiac output rather than in central blood volume.

TABLE 5.—*Central Blood Volume and Mean Circulation Time in Seven Patients at Various Electroencephalographic Levels of Cyclopropane Anesthesia*

	Depth of Anesthesia									
			Level 2							
	Awake		Before Intubation		After Intubation		Level 4		Level 2	
Case No.	Central Blood Volume, Liters/Min.	Mean Circulation Time, Sec.	Central Blood Volume, Liters/Min.	Mean Circulation Time, Sec.	Central Blood Volume, Liters/Min.	Mean Circulation Time, Sec.	Central Blood Volume, Liters/Min.	Mean Circulation Time, Sec.	Central Blood Volume, Liters/Min.	Mean Circulation Time, Sec.
1	1.9	7.5	2.1	12.2	1.1	7.8	2.1	10.9	2.3	6.1
2	1.2	5.1	0.95	7.3	1.1	7.3	0.80	7.9	0.73	6.8
3	1.8	6.2	1.5	8.4	1.2	9.8	1.2	10.8	1.3	8.8
4	2.1	9.2	1.9	11.4	2.0	10.8	1.9	8.2	1.9	9.8
5	0.92	5.6	1.3	6.6	1.5	8.2	1.2	7.4	1.7	7.4
6	1.5	6.0	1.4	7.0	1.3	5.4	1.2	8.2	1.3	6.8
7	1.2	5.1	1.1	7.4	1.2	7.6	1.1	7.6	0.95	6.2

Comment

Under the conditions of these observations a decrease in cardiac index was uniformly seen with the onset of light anesthesia with cyclopropane. As anesthesia deepened to level 4, the cardiac index decreased further in four of the seven patients. With return of anesthesia to light levels, values for cardiac index increased rapidly toward those initially observed in all patients. Therefore, the decrease in cardiac index appears to be directly related to depth of anesthesia. During light anesthesia the decrease in cardiac index reflects primarily a decrease in pulse rate rather than in stroke volume, whereas the decrease in cardiac index in deep anesthesia reflects decreases in both pulse rate and stroke volume. The decrease in pulse rate may be due to a reflex response of the heart to increased arterial pressure or may represent direct depression of that part of the heart initiating the cardiac impulse. It is possible that cyclopropane directly depresses the myocardium, thus accounting for the decrease in stroke volume. The observed increases in central venous pressure would be compatible with this interpretation.

Since respirations were assisted in these patients, it is possible that the decrease in cardiac index was in part due to increased pressure in the airway. However, it is our impression that the mean airway pressure was not greater during deep levels than during light levels of anesthesia and that the variations in cardiac index under these conditions are attributable to the cyclopropane.

Peripheral resistance increased with light anesthesia and increased further during deep anesthesia. However, as anesthesia was lightened again, peripheral resistance decreased rapidly. Therefore, the change in peripheral resistance was related directly to depth of anesthesia. It is interesting to note that the decreased cardiac output and pulse rate and the increase in mean arterial blood pressure and peripheral resistance found in this study paralleled those observations found in patients after being given infusions of levarterenol (*l*-norepinephrine)bitartrate.[6] There is some evidence that the concentration of epinephrine-like substances in the blood is increased during cyclopropane anesthesia.[7] The mean peripheral arterial blood pressure level was increased at all levels of anesthesia over the preanesthesia level, and, since all levels of anesthesia were accompanied by a decrease in cardiac output, it would appear that the increase in peripheral arterial blood pressure was a result of increased peripheral resistance.

All hemodynamic variables returned rapidly toward preanesthetic values on lightening of the level of anesthesia. This is compatible with rapid elimination of cyclopropane from the patient and offers an explanation for the value obtained after intubation. During the period of intubation when the patient was breathing air, cyclopropane was rapidly lost by exhalation and anesthesia became lighter. Anesthesia of electroencephalographic level 2 was induced again in each patient. The resulting changes in the hemodynamic variables were probably due to failure of the patient to reach an anesthetic equilibrium at this level before observations were made.

Of interest in this study was the cardiac arrhythmia that occurred in one patient (case 1). The arrhythmia occurred during deep anesthesia only and was co-

existent with a low pH of arterial blood and depressed respirations. This was the only patient in the series whose respirations were unassisted.

Summary

Hemodynamic variables were studied while seven surgical patients were in different electroencephalographic levels of cyclopropane anesthesia. Cardiac index and pulse rate decreased with increasing depth of anesthesia. The stroke volume showed no significant change during light anesthesia; during deep anesthesia a significant decrease was noted. Peripheral resistance increased with increasing depth of anesthesia. An increase in arterial blood pressure over preanesthetic levels was observed at all levels of anesthesia. There was no consistent change in calculated central blood volume, but a moderate increase in central venous pressure occurred during anesthesia. The hemodynamic alterations during cyclopropane anesthesia rapidly returned toward preanesthetic values on lightening of the level of anesthesia.

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Hormone-Dependent Cancers.—Reviewing our present knowledge of hormones in relation to cancer, we can say that certain cancers of the breast and of the prostate are hormone-dependent; in such cases, if the stimulating hormone is removed from the body by operation, or neutralized by giving an antagonistic hormone, the tumour regresses. Other tumours of these organs are hormone-independent. Possibly some tumours which first show a regression following removal of the hormonal stimulus but which later relapse, may have changed their character from a hormone-dependent tumour to a hormone-independent tumour, but we cannot be certain of this as yet; in some relapsing cases production of the stimulating hormone elsewhere in the body, as in the glandular "rests" may bring about a reactivation of the tumour. Mammary cancers may be classified into œstrogen-dependent and non-œstrogen dependent tumours. If the ovaries produce almost all the circulating œstrogen in the body in some premenopausal women and the adrenals either none at all or an amount below the threshold of tumour stimulation, then there may be a regression following oophorectomy; the subsequent relapse may be due to a gradual increase in the output of œstrogen from the adrenal. In other premenopausal women a regression probably only follows the removal of both the ovaries and the adrenals. Within these limitations therefore we can use the terms ovary-dependent and adrenal-dependent tumours. In the postmenopausal group, when the ovaries are partly atrophied, the adrenals produce most of the œstrogen, hence the removal of the adrenals as well as the ovaries is necessary to bring about a regression. The evidence suggests that there is also a growth-hormone dependent tumour, so that hypophysectomy may cause a regression in some cases which have not been influenced by oophorectomy and/or adrenalectomy. Many prostatic cancers are androgen-dependent and testis-dependent; dependence upon the adrenal appears to be much less common than in mammary cancers.—L. N. Pyrah, Hormones in the Treatment of Cancer of the Breast and Prostate, *The British Journal of Surgery*, July, 1956.

CYSTINOSIS IN AN ADULT

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• *In contrast to the disease in children, which is usually fatal, cystinosis (deposits of cystine crystals in tissues of the body) in the two reported instances occurring in adults was a relatively benign condition. This condition, sometimes called Lignac-Fanconi syndrome, should not be confused with benign cystinuria of adults, in which the cystine level in the urine is elevated but there are no crystals in tissues. In the case reported, cystine crystals were discovered in the cornea and conjunctiva during a routine examination.*

Cystinosis, or the Lignac-Fanconi syndrome, is a well-established entity,[1] occurring in infants and children, wherein crystals of cystine are deposited in many tissues of the body, including the cornea and conjunctiva. Here the crystals can be seen, by slit-lamp examination, to have a characteristic appearance and distribution that can be differentiated readily from any other condition. Patients with cystinosis usually fail to grow properly (dwarfism) and have renal tubular disease with consequent glycosuria, aminoaciduria, and hypokalemia. Rarely have such patients survived the first decade of life.

We have had occasion to study a normal adult who had crystalline deposits in his corneas and conjunctivas identical to those that have been described in children and infants with cystinosis. The crystals had the same distribution clinically and histologically and they gave the same results histochemically and chromatographically as we and others have previously found with crystals from the conjunctivas of patients with cystinosis. We are aware of only one possibly similar case of cystinosis in an otherwise normal adult, reported by Burki and Rohner.[2] This was in a 50-year-old woman who was found to have crystals in the cornea that were clinically similar to those found in infants with cystinosis. No crystals were seen in the conjunctiva, and no biopsy was done. Systemic investigation showed only a questionably significant aminoaciduria.

The significance of these two cases lies in the inference that cystinosis in the adult is a benign condition, in contrast to the disease in children, which is almost universally fatal.

Report of a Case

The patient was a 23-year-old university student who was incidentally discovered to have crystals in his cornea and conjunctiva during a routine examination for refraction. The only symptoms referable to his eyes were those attributable to a low degree of myopia. Excepting for one occasion, when, at the age of 9 years, he was told that urinalysis indicated that he had diabetes, he had had no signficant medical abnormality and he had developed normally. The results of several subsequent urine tests and one blood sugar determination were said to have been normal.

The patient was 6 ft. (183 cm.) in height, weighed 180 lb. (81.6 kg.), and showed normal osseous and muscular development. Nothing of significance was found on physical examination except mild acne of the face and back. The blood pressure was 152/84 mm. Hg. There were no tophi and there was no limitation of joint movement and no enlargement of the liver.

The only significant abnormality found was in the eyes, and here the changes could be seen definitely only on slit-lamp examination. The faintest possible haze of the cornea could be seen by the naked eyes with strong focal illumination, and nothing abnormal could be seen by ophthalmoscopy. The corrected visual acuity was 20/15 in each eye. When viewed by slit-lamp biomicroscopy, however, the corneas were seen to be uniformly studded with a myriad of highly reflectile particles situated in the anterior half of the stroma centrally but extending throughout the entire thickness of the stroma peripherally. In this latter region, a lamina of the particles was situated just in front of the posterior surface, extending several millimeters toward the pupillary area, so that the particles had an hourglass distribution in the periphery of the cornea. The particles extended across the limbus without any line of demarcation.

The individual particles appeared with the high magnification ($\times 20$) to consist of conglomerates of highly reflectile, polychromatic needles arranged in a random fashion. They did not fluoresce with ultraviolet light. An attempt was made to photograph them with the Donaldson camera (fig. 1).

The conjunctivas also showed numerous abnormal deposits scattered throughout the superficial stroma. In apparent contrast to those in the cornea, these particles appeared chalk-white and nonreflectile. They were more obviously clumped and not as uniformly distributed as in the corneal stroma. They did not appear to be oriented about the blood vessels or any other recognizable structure of the conjunctiva. Because of the white background of the sclera, they were less conspicuous than those of the cornea and could not be photographed.

A preliminary urinalysis done prior to the patient's hospitalization showed a trace of reducing substance in the urine when it was tested with Fehling's solution, but subsequent 24-hour specimens showed no reducing substances. The alpha amino nitrogen excretion in a 24-hour urine sample was 89 mg. per liter, with a total nitrogen level of 16.2 Gm. per liter, thus showing that 0.55% of the nitrogen in the urine was directly attributable to amino acids. The uric acid level was 81 mg. per 100 cc. Blood studies, interpreted as normal, gave the following results: the level of uric acid was 5.3 mg. per 100 cc.; of carbon dioxide, 32 mEq.; of sodium, 137 mEq.; of potassium, 4.4 mEq.; and of chlorides, 100 mEq. per liter; the pH was 7.48.

An elliptical piece of conjunctiva measuring 4 by 7 mm. was removed from the temporal portion of one eye for chromatographic and histological study. Sections were cut with the specimen in the fresh-frozen state and after it had been fixed with alcohol. After approximately 30 sections had been cut, the remaining tissue was placed in 5 ml. of 4% formaldehyde solution for 18 to 20 hours. This dissolved out the crystals (as shown by section of the remaining tissue), and the formaldehyde solution was filtered and brought to dryness in a vacuum. The residue was repeatedly dissolved in 1 *N* hydrochloric acid and dried to insure total removal of the formaldehyde. The residue was then dissolved in 5 ml. of water and dried to remove the hydrochloric acid. Finally, the dried residue was dissolved in 0.1 ml. of 0.1

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N hydrochloric acid and the solution concentrated to 10 to 20 microliters. The concentrate was spotted on Whatman no. 1 filter paper for chromatographic separation and identification.

Formaldehyde extracts were prepared in this way on two separate pieces of conjunctiva and chromatographed in two dimensions, with use of butanol:acetic acid:water (4:1:5) for one dimension and water-saturated phenol containing a 0.1% cyanide solution in the chamber for the second dimension. The chromatogram was developed by ascending technique, with 21 hours in butanol:acetic acid:water and 20 hours in water-saturated phenol. The papers were then dried and sprayed with a 2% alcoholic solution of ninhydrin for location of position of the amino acids.

Solutions of 22 known amino acids were run in the same solvent systems for the same length of time for reference, but only those for which the results corresponded to the results with the spots obtained from the biopsy specimen will be mentioned. Extraction and chromatography were done similarly on conjunctival biopsies obtained from two normal persons. The specimen obtained from the patient here described showed spots corresponding to aminoacetic acid (glycine), tyrosine, serine, oxidized glutathione, cystine, alanine, and leucine, while the two control specimens showed cystine, serine, leucine, and alanine. Although the control specimens were of the same approximate size as the test specimen, the chromatographic spots were weaker for all the amino acids by a factor of approximately 3. These results were interpreted as indicating that the patient in question did show an abnormal amount of cystine in the conjunctiva as well as an excess of several other amino acids. Chromatography has previously been employed several times for the identification of the conjunctional crystals in infantile cystinosis.[3]

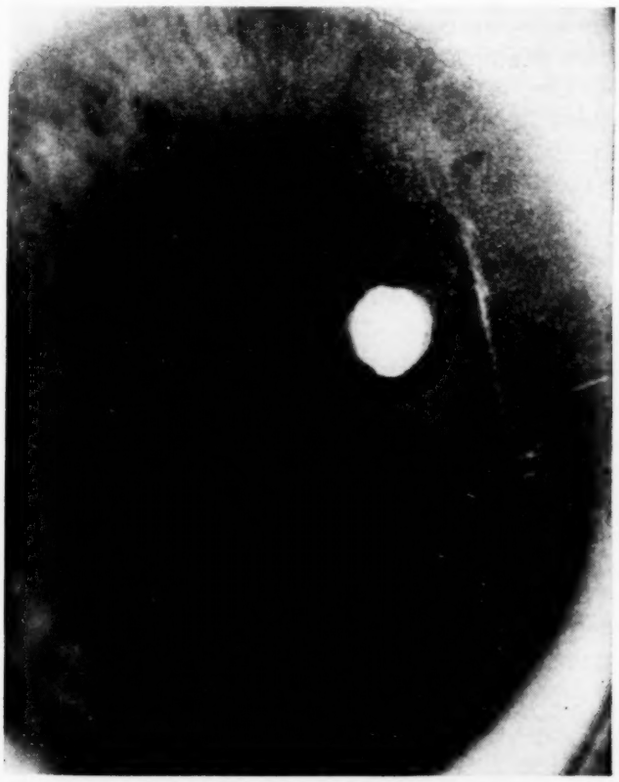

Fig. 1.—Photograph of eye. Highly reflectile particles can be seen about image of light reflected from cornea. Actually, crystals were uniformly distributed over entire anterior portion of cornea.

Sections of the fresh-frozen and alcohol-fixed tissue showed abundant crystals in the region of the epithelial stromal junction, without any reaction on the part of the tissue (fig. 2). The crystals were predominantly rectangles of various sizes, but all were less than 10μ, with occasional squares and hexagons. Many were vividly birefringent (fig. 3). The crystals appeared to be free in the tissue and were often present as clumped masses such as had been seen clinically. None were definitely intracellular.

The preponderance of the crystals in the epithelial-stromal area was a conspicuous feature. Some of the crystals appeared to be within the deep epithelial

Fig. 2.—Biopsy specimen of conjunctiva stained according to the von Kossa technique. Crystals blackened by reduced silver can be seen predominantly situated at epithelial-stromal junction.

layers and some in the most superficial stroma, but none were more than 0.5 mm. from the junction. Many clumps seemed to be aggregates about the rete pegs. There were no concentrations in the walls of blood vessels such as we have observed in a case of infantile cystinosis.[3c] The crystals did not take the eosin or hematoxylin stains, but, as previously found in the case of infantile cystinosis,[3c] they were outlined by the silver of the von Kossa stain and their visibility was thereby enhanced.

To determine whether the crystalline deposits in the present case were identical with those in classic cystinosis of infancy, a series of sections from the present patient and from a patient with a proved case of cystinosis[3c] were immersed in solutions of different pH for various lengths of time. In all instances it was found that the crystals were readily soluble in solutions of sodium hydroxide having a pH of 9 or more and slowly soluble in the pH range of 6 to 9. In acid ranges (hydrochloric acid) the crystals were more slowly soluble. Known cystine crystals embedded in gelatin and treated in the same way behaved similarly. The crystals in the tissue of the

present patient were insoluble in ether, acetone, and chloroform and only slightly soluble in methyl alcohol and ethyl alcohol.

Finally, the specificity of the crystals as cystine was established by determining their relative insolubility in a cystine-saturated solution. Sections from the present patient and from a patient with known cystinosis were immersed in phosphate buffers adjusted to pH 3.8. Whereas the crystals began to disappear in about 15 minutes in solutions that had not had cystine added, they showed no change in 24 hours' time in solutions that were saturated with cystine. This procedure, suggested to us by Dr. Morton Grant, does not appear to have been employed previously in identification of crystals in cystinosis, but it is a simple and seemingly reliable test of considerable specificity.

Fig. 3.—Photograph of crystals in tissue taken through crossed polaroids.

Comment

There can be little doubt of the identity of the ocular findings in this case and in cases of juvenile cystinosis. The clinical and histological findings are identical, and the chromatographic findings and results of solubility studies are consistent with such an identification. It was not possible in our case, nor in the one probably similar case previously reported, to obtain material from tissue other than the eye, but it would seem most unlikely that this deposition of crystals was limited to the cornea and to the conjunctiva. It is also not possible to state how long the crystals had been present in our patient. Thus we cannot state that the present case arose *de novo* in the adult. What is important is that this case and the one previously reported by Burki and Rohner[2] show that, in the adult, cystine crystals may be deposited in tissues abundantly without necessarily involving a grave prognosis such as is the case in infantile cystinosis.

The present case is, of course, not to be confused with the so-called benign cystinuria of adults. This latter process, which appears to be due to lowered renal threshold, differs in that the cystine level in the urine is elevated but there are no crystals in tissues.

The deposition of crystals in cystinosis is believed to be associated with the relative insolubility of cystine in body fluids. In our patient, the striking predilection of the deposits for the subepithelial zone of the cornea (and to a lesser extent for the subendothelial region of the cornea) and for the epithelial-stromal boundary of the conjunctiva suggests that the epithelium, notoriously high in sulfhydryls, favors the local precipitation of cystine or accumulation of excess cystine.

Summary

A case has been discovered of what is believed to be cystinosis in an otherwise healthy adult. This is the second case of its kind in the literature and the first to have been studied histochemically and chromatographically. Cystine crystals were found abundantly in the cornea and conjunctiva. Although the ocular features were identical, clinically and pathologically, with those often observed in cystinosis of infants and children, the clinical course of the disease is entirely different. Whereas its pediatric counterpart is accompanied by dwarfism, renal tubular insufficiency, and usually death within the first decade, the disease in the adult is entirely benign.

Addendum

Since the foregoing report was submitted, Mr. Jeremiah Silbert of this laboratory has succeeded in dissecting out a small quantity of the individual crystals by means of micromanipulation. These crystals were subjected to chromatographic analysis (butanol:acetic acid:water) and found to have the same approximate Rf value as a control sample of cystine, and these values coincide most nearly with those for the cystine extracted from the conjunctiva, as described in the paper.

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ETIOLOGICAL ROLE OF SODIUM CHLORIDE INTAKE IN ESSENTIAL HYPERTENSION IN HUMANS

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• The possibility that a high dietary intake of sodium chloride might predispose an individual to hypertension was investigated by classifying 1,346 adults according to their blood pressure and again according to their habitual consumption of table salt. The 105 persons classified as hypertensive were found not to be randomly distributed; there were 61 among the 581 persons with high salt intake, 43 among the 630 with average salt intake, and 1 among the 135 with low salt intake. The departure from randomness of distribution was not explainable as an accident of sampling, and the association between salt intake and hypertension was accepted as significant. Further classification of the subjects as thin, average, overweight, and fat showed that obesity further increased the probability of hypertension in people on high salt intake.

In 1954 we presented evidence that was interpreted to indicate a relationship between the level of sodium intake and human essential hypertension.[1] The original series of observations on 547 subjects has now been extended to include a total of 1,346 adults. The earlier findings have been confirmed: the data are highly suggestive of a correlation between salt (i. e., sodium chloride) intake and the incidence of hypertension.

The original paper [1b] may be consulted for details of the rationale. The possible role of sodium in the etiology of essential hypertension in humans was suggested by (1) the need for sodium in the production of certain forms of experimental hypertension [2]; (2) the virtual absence of hypertension among primitive races, all of whom appear to have a low-sodium diet [1b]; and (3) the amelioration of hypertension in some persons by restriction of sodium.[3] Given these three observations, the following question was suggested: Did individuals who had an apparently higher salt intake have significantly more hypertension than those with a lower salt intake? If the answer were that high salt intakes were indeed associated more frequently with hypertension, a cause-effect relationship would certainly be implicated, although not necessarily established. While the effects of sodium and chloride could not be separated here, all experimental and clinical evidence indicated that it was the sodium, not the chloride, ion that was important. For this discussion, therefore, the terms sodium chloride and salt may be interpreted to refer only to sodium.

Material and Method

Early in 1953 the present study was begun on every member of the Brookhaven Laboratory staff who reported for annual physical examination to one of us (R. A. L.). Both scientific and nonscientific personnel were included, and no selection by the physician occurred. However, the following selective processes were known to be in operation: 1. Preemployment physical examinations would tend to eliminate individuals with serious diseases of any sort. 2. Because of the laboratory's young age (about 10 years) and the character of the research (the study of the atomic nucleus and isotopes), the mean age of the scientists as well as their associates probably would be lower than the national average. 3. The employment policies at the laboratory limited the age range to from 18 to 65. 4. Females had the frequently exercised prerogative of being examined by a woman physician, so that the total sample had a 5:1 ratio of males to females.

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In our society it seemed likely that the major source of variation in salt intake might derive from the addition of salt at the table by the individual concerned. Of perhaps equal importance, however, was the fact that this addition of salt could be qualitatively analyzed over a lifetime. With this rationale in mind, each person was questioned as to his salt intake and classified into one of three groups, as follows: 1. Low intake—this individual denied adding, or ever having added, salt to his food at the table (the present widespread use of low-sodium diets made it imperative to specify whether the separation from salt shakers had been recent or lifelong). 2. Average intake—this individual added salt to his food, if after tasting, it was insufficiently salty for his palate. 3. High intake—this person routinely added salt to foods customarily salted before tasting them. An individual who would have been classified as a member of the high or average groups by past habits, but who had changed to average or low intake for any reason, was classified as a member of the group with the greater intake to which he had belonged formerly.

As mentioned earlier,[1b] certain defects in this type of classification were obvious: 1. It lacked precision in estimating the intake. 2. No allowance was made for variation in the salt content of foods prior to their arrival at the table due to natural variations in content as well as those diversities due to preparation, preservation, and cooking. 3. No provision was made for differences in perception of saltiness among individuals or even possibly in the same individual at different times. Despite these known limitations, it was believed that with sufficient members in the series some or all of these variables might be canceled out and the conceptual implication of a low versus a high salt intake might be tested.

At the time of the physical examination, record was made of the subject's age, sex, blood pressure, race, and nutritional state. The number of non-Caucasians proved to be so small that race has been disregarded in the calculations. Estimates of nutritional state were based upon the undressed appearance, from which each patient was classified as thin, normal, overweight, or fat. Although this classification was not exact, there appeared to be no need for more detailed anthropometric classification. The blood pressure was measured with a mercury sphygmomanometer while the patient sat quietly in the upright position with the arm resting easily on the examiner's table. Systolic and diastolic blood pressure levels were assumed to be represented by the first and fourth auscultatory phases, as recommended by a committee of the American Heart Association.[4] Hypertension was defined as a level of at least 140 mm. Hg systolic in combination with a pressure of at least 90 mm. Hg diastolic. If the blood pressure was not in this (defined) hypertensive range at the time of the examination but previous incontestable records of such elevation were available, this fact was noted and such individuals were classified as having hypertension. Although not all persons with transient elevations of blood pressure will develop sustained hypertension, available data suggest that among such individuals the disease occurs at least two or three times more often than in persons without such transient elevations.[5] It might be of added significance if even these persons with possible hypertension were found to be absent in the low-intake group.

TABLE 1.—*Uncorrected Data on Salt Intake and Incidence of Hypertension in Humans**

Sodium Chloride Intake	Total Subjects		Subjects with Hypertension	
	No.	% of Total	No.	% of Intake Group
Low	135	10.0	1	0.7
Average	630	46.8	43	6.8
High	581	43.2	61	10.5
Total	1,346	100.0	105	7.8

* The distribution of subjects with hypertension was significantly different among the three groups as tested by the chi-square distribution, with $X^2 = 16.1$ and $p<0.001$.

TABLE 2.—*Sodium Intake, by Age and Sex of Subjects**

Sodium Chloride Intake	Age, Yr.	Males		Females	
		No.	% of Intake Group	No.	% of Intake Group
Low	35.2(±9.2)	101	74.8	34	25.2
Average	34.7(±10.3)	522	82.9	108	17.1
High	34.4(±10.0)	501	86.2	80	13.8
Total	34.6(±10.0)	1,124	83.5	222	16.5

* Sex distribution significantly different among the three groups ($p<0.01$).

Observations

The uncorrected data on 1,346 consecutive patients are shown in table 1. (Data on three subjects were excluded as of no consequence in the present study.[1b]) Very briefly, among the 135, 630, and 581 members of the low, average, and high sodium chloride intake groups, there were 1, 43, and 61 persons with hypertension respectively. The group with average salt intake had an incidence of hypertension that did not differ significantly from that predicted by random distribution and therefore is irrelevant to the development of the thesis in this paper. This table indicates that the probability that a distribution of hypertension like that found among these three groups would occur by chance is less than 1 in 1,000 (chi square = 16.1, $p<0.001$). From table 2, it is evident that, while mean ages were the same among the three groups, sex distribution differed significantly, with more females in the low-intake group. Although this difference probably is of no importance at these ages, the data were then analyzed for the 1,124 males, as shown in table 3. The findings remain essentially unchanged from those shown in table 1. Again there was a high degree of statistical significance to the distribution among the three groups ($p<0.001$). When tested against null value, the low-intake group had significantly less ($p<0.01$) hypertension and the high-intake group had significantly more ($p<0.02$) hypertension than would have occurred by chance alone.

The nutritional classifications of the 1,124 male subjects are outlined in table 4. There was no significant difference among the three salt-intake groups; however, the percentage of overweight or fat individuals (46.5%) among the males with hypertension, shown in table 5, exceeded that among the entire male population (26.8%) to a significant degree ($p<0.001$). For statistical analysis the four nutritional groups were combined into two: thin and normal became "non-overweight," and overweight and fat became "overweight." Comparisons then were made among individuals who were classified as having low or high salt intakes and who were overweight or non-overweight. Table 6 summarizes the significant differences found by such comparisons. The following conclusions may be drawn from the data in table 6: 1. Individuals who are not overweight but who are on a high-salt diet will have several times the incidence of hypertension found in similar individuals on a low-salt diet. 2. Among individuals who are on a high-salt diet, those who are overweight will have significantly more hypertension than will those who are not overweight. 3. Those individuals who are both overweight and on a high-salt diet will have a much greater incidence of hypertension than will individuals not overweight and on a low-sodium diet.

TABLE 3.—*Corrected Incidence** *of Hypertension in Males Only*

Sodium Chloride Intake	Age, Yr.	Total Subjects		Subjects with Hypertension		
		No.	% of Total	No.	% of All with Hypertension	% of Intake Group
Low	36.8(± 9.4)	101	9.0	1	1	1
Average	36.1(±10.7)	522	46.4	38	39	7.3
High	35.7(±10.2)	501	44.6	58	60	11.6
Total	36.0(±10.4)	1,124	100	97	100	8.6

* For all three groups, $X^2 = 14.3$ and $p<0.001$; for low-intake group, $X^2 = 7.42$ and $p<0.01$; for high-intake group, $X^2 = 5.54$ and $p<0.02$.

Comment

One important question still to be answered is whether the three salt-intake classifications used in this study have any relation to actual salt ingestion. Originally [1b] it was thought that the classification might be useful for the low and high groups but that probably the average group would extend over the entire spectrum from low to high. Some preliminary data suggest that this is correct. A series of individuals from all three groups, with and without hypertension, has now been studied by collecting all urines for a minimum period of 7 days (and up to 38), from which an accurate index of sodium intake can be realized.[6] From these data it is pertinent to note that the individuals with a low intake without hypertension had significantly lower urine sodium outputs (and therefore intakes) than the persons with hypertension, whatever the group into which the latter had been classified in this study. Furthermore, the single subject with a low intake who was found to have hypertension had a urine sodium level like that of the other hypertensives, rather than similar to that of the other members of the low-intake group. From these unpublished observations, it is likely that the following conclusions

TABLE 4.—*Nutritional Grouping of 1,124 Males*

	Sodium Chloride Intake								
	Low		Average		High		Total		
Nutritional Groups	No.	%	No.	%	No.	%	No.	%	
Thin	16	15.8	70	13.4	75	15.0	161	14.3	73.2
Normal	62	61.4	314	60.2	286	57.0	662	58.9	
Overweight	20	19.8	112	21.4	116	23.2	248	22.1	26.8
Fat	3	3.0	26	5.0	24	4.8	53	4.7	
Total	101	100.0	522	100.0	501	100.0	1,124	100.0	

will emerge: the arbitrary low-average-high classification based on the use of salt at the table, which was devised for exploration of a theory, probably is generally valid. It will, however, be subject to individual exceptions, because of the defects noted earlier in this paper. However, the data suggest that among those individuals who actually have a low-sodium diet, as measured by urine sodium level, hypertension will be significantly less than among those people who have a high-sodium diet, judged in the same fashion. Therefore, the original thesis seems valid; namely, that there is a significant relationship between the level of sodium intake and the development of essential hypertension.

The question will be asked as to whether the enhanced salt intake of individuals predisposed to or with hypertension is caused by, rather than a cause of, the disease. It has been suggested that persons with hypertension have an increased appetite for salt.[7] The present report cannot exclude this possibility. It may be pertinent to note, however, that for eight years one of us (L. K. D.) has used drastic prolonged limitation of sodium (40-125 mg. per day) in the study and treatment of patients in all stages of this illness. This was done under metabolic ward conditions, without evidence of salt-craving, such as might be expected if excessive salt appetite were part of the disease. Since many of these patients had been very heavy users of salt prior to such reduction, this probably is relevant to the present discussion.

TABLE 5.—*Nutritional Grouping of Males with Hypertension*

	Sodium Chloride Intake			Total		
Nutrition Groups	Low	Average	High	No.	%	
Thin	...	2	3	5	5.1	53.5
Normal	...	19	28	47	48.4	
Overweight	...	13	20	33	34.1	46.5
Fat	1	4	7	12	12.4	
Total	1	38	58	97	100.0	

It seems fairly well established that essential hypertension occurs more commonly in certain families than in others.[8] If this represents true hereditary rather than common environmental factors, it does not mean that heredity alone is sufficient. In rheumatic fever, for instance, hereditary factors are known to be important [9]; yet, if streptococcic infections are avoided with prophylactic antibacterial therapy, rheumatic fever does not result.[10] We would like to suggest that similarly, in the individual hereditarily predisposed to essential hypertension, the actual etiological agent is environmental; namely, the level of ingestion of salt. In people without such hereditary predisposition, resistance to the effects of ingestion of sodium might be greater, but this resistance could be overcome by a greater ingestion over a longer period.

The failure of many people on a high-salt diet to develop hypertension does not necessarily invalidate the proposed hyothesis: With most disease-inciting agents, exposures of apparently equal degree of different individuals will be followed by development of the disease in some but not in others. Presumably in essential hypertension there are unknown factors that are of importance in modifying the effect of a given level of ingestion of sodium.

It is known that overweight individuals suffer from hyertension more commonly than do non-overweight subjects.[11] Could it be that in eating more food generally, more salt is ingested simultaneously? This is one possible explanation at least.

TABLE 6.—*Statistically Important Difference* in Incidence of Hypertension in Males Only*

Non-overweight subjects	
High sodium chloride intake vs. Low sodium chloride intake	$X^2 = 7.2$, $p<0.01$
High sodium chloride subjects	
Overweight vs. Non-overweight	$X^2 = 10.8$, $p = 0.001$
Combination resulting in greatest statistical significance	
High sodium chloride intake, overweight vs. Low sodium chloride intake, non-overweight	$X^2 = 16.97$, $p<0.001$

* In each pair, the first group has the greater incidence of hypertension. The significance of the difference in incidence of hypertension was estimated by the standard chi-square test.

In view of the foregoing considerations, it is proposed that the level of sodium intake is the primary etiological factor in the development of essential hypertension.

Summary and Conclusions

Among 1,346 adults who were classified according to their sodium chloride intake at the table, there were only 135 classed as having a low intake, while there were 630 and 581 in the average-intake and high-intake groups respectively. The 105 persons with hypertension were distributed among the salt-intake groups in nonrandom fashion as follows: low intake, 1; average intake, 43; and high intake, 61. Tested by the chi-square method, the probability of such a distribution of hypertension occurring by chance was found to be less than 1 in 1,000. The group with low salt intake had significantly less and the group with high salt intake significantly more hypertension than would be expected from random distribution.

By dividing all individuals into overweight and non-overweight groups in addition to the sodium chloride categories, the following statistically significant ($p<0.01$) conclusions can be derived: 1. Individuals who are not overweight but who are on a high-salt diet will have several times the incidence of hypertension found in similar individuals on a low-salt diet. 2. Among individuals who are on a high-salt diet, those who are overweight will have significantly more hypertension than will those who are not overweight. 3. Those individuals who are both overweight and on a high-salt diet will have a much greater incidence of hypertension than will individuals not overweight and on a low-sodium diet. The hypothesis is submitted that the level of sodium intake is the primary etiological factor in the development of essential hypertension.

Phelps Crump, Ph.D., assisted on all statistical matters in this study.

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Chemotherapy of Renal Tuberculosis.—An analysis of 219 consecutive autopsies in patients with tuberculosis since the introduction of modern chemotherapy reveals a striking contrast with the pre-chemotherapy findings.... Almost all of these patients had prolonged antituberculosis therapy with alternating courses of several drugs. A number of observations in this series are worthy of note.... The real surprise, however, is the very low percentage of minimal tuberculous involvement. While in 1028 autopsied cases without chemotherapy there were 279 with minimal lesions, in those with prolonged treatment with antituberculous drugs there were only 7 instances of military foci in 219 cases. This point alone should prove the effectiveness of antituberculous chemotherapy in curing minimal lesions or preventing them at the end stage of hematogenous dissemination. In this latter series, the patients with minimal renal foci and tuberculous involvement of the prostate were symptomless. Of five cases with organ tuberculosis, four were symptomless, though all had intermittent pyuria. There seems to be little doubt that minimal renal tuberculosis should be treated with chemotherapy. However, a practical difficulty lies in the determination of the extent of the tuberculous lesion in the kidney. The usual diagnostic procedure sometimes inaccurately delineate the extent of the disease.... Chemotherapy is indicated in every case of renal tuberculosis, although its effectiveness may be limited by the nature of the disase present. Overall effectiveness has been marked and has been reported in several large series.—A. Sporer, M.D., and G. D. Oppenheimer, M.D., Renal Tuberculosis, *Journal of the Mount Sinai Hospital,* July-August, 1956.

CLINICAL NOTES

CYSTICERCOSIS CEREBRI—CESTODE INFESTATION OF HUMAN BRAIN

REPORT OF A CASE OCCURRING IN LOUISIANA

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Invasion of the central nervous system of man by the larval form of the pork tapeworm is rarely encountered in the United States [1] and Canada, and previous studies from these countries have reported individuals who were former residents of known endemic areas. However, in South America and certain countries of the Far East, the prevalence of cysticercosis cerebri is relatively high because of the greater frequency of intestinal infestation with Taenia solium in man. This difference in prevalence is due in part to the fact that raw pork is not usually eaten in the United States and Canada and also that these countries have public health laws regarding the disposal of garbage and the inspection of meat for human consumption. The purpose of this paper is to present a case of cerebral cysticercosis of the racemose type that was apparently contracted in Louisiana.

Cysticercosis is caused by larvae of the cestode T. solium. The usual intermediate host, the pig, becomes infested with the parasite as a result of ingesting material contaminated with egg-laden feces. The eggs hatch, and the larvae penetrate the wall of the pig's intestine, eventually becoming encysted in various sites, particularly the skeletal muscles.

According to Faust,[2] man may become infested in a similar manner. The sources of the eggs that humans ingest are (1) feces from a person who harbors an adult tapeworm (heteroinfection); (2) feces containing eggs that are transferred from anus to mouth by unclean hands of an infested person (external autoinfection); and (3) the small intestine, from which ripe eggs may be carried by reverse peristalsis into the stomach, where they are conditioned for hatching (internal autoinfection). The eggs hatch in the upper portion of the small intestine, and the larvae quickly penetrate the intestinal wall, entering the lymphatics and blood vessels. They are then widely and fortuitously distributed and develop into cysticerci at the site of localization.

The morphogenesis of cysticerci in the tissue has been described as taking place by a proliferation of the body wall of the larva together with central liquefaction and cavity formation. A scolex develops and invaginates into the preformed cavity, giving rise to the so-called bladder worm. In most locations within the host the cyst reaches its full size (about 1 cm. in diameter) in approximately 10 weeks.[3] The skeletal muscles, the chambers of the eye, and the central nervous system are the sites in which cysticerci most frequently are observed. In skeletal muscle they excite a fibroblastic proliferation and are soon surrounded by a fibrous capsule. These lesions eventually calcify. Within the central nervous system, the larvae may localize within the leptomeninges or brain substance. Localization within the parenchyma is followed by encapsulation and calcification. Within the leptomeninges, a single cyst may develop numerous irregular projections that may extend into the brain parenchyma. On section, such lesions appear multicystic or racemose. The racemose type of cysticercosis develops in the leptomeninges overlying the brain stem and cerebellum. In this location, projections of the cyst may extend for distances as great as 15 cm. Within the brain parenchyma, individual larvae seldom produce lesions that exceed 1 cm. in diameter.

Dixon and Hargreaves [4] have established the importance of parenchymal cysticercosis cerebri as a causative factor of epilepsy in persons who previously lived in the Far East. Wilson [5] has described the pathological changes that occur in the leptomeninges and brain parenchyma. In addition, he emphasized the frequency with which these parasites form racemose cysts when they localize in the leptomeninges of the posterior fossa. Bickerstaff [6] observed that the racemose lesion located at the base of the brain was more common in older subjects, whereas parenchymal involvement tended to occur in younger persons. Within the parenchyma of the central nervous system the larvae may eventually become calcified and are then demonstrable roentgenographically. As long as the larvae remain alive, only a minimal local inflammatory reaction is provoked. The death of the larvae produces an intense local granulomatous inflammation in the leptomeninges, with foreign-body giant-cell reaction and fibrosis.[7] South American authors have reported that in some regions approximately 25% of all hospital patients admitted with symptoms suggesting the presence of intracranial space-occupying lesions had, in fact, cysticercosis cerebri of the racemose type.[8]

The neurological symptoms of cysticercosis cerebri occur late in the course of the disease,[9] but focal or localizing clinical signs rarely develop. Increased intracranial pressure, which occurs in the racemose type, causes papilledema, headache, nausea, and vomiting. Mental deterioration and personality changes are common in the advanced stages of the disease of both the parenchymal and racemose type.

Diagnosis is difficult during the early stage of larval invasion, and cerebral symptoms are not a clinical feature. Eosinophilia of the peripheral blood occurs only during the acute stage of generalized dissemination. A history of the passage of tapeworm segments in the stool may suggest the diagnosis. The cerebrospinal

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fluid may show a rise in the protein level and a pleocytosis that may be lymphocytic, neutrophilic, or predominantly eosinophilic during the early stage of central nervous system invasion. When subcutaneous nodules are present, histological examination of the excised nodule reveals the intact Cysticercus. During the early stage of dissemination, a microscopic study

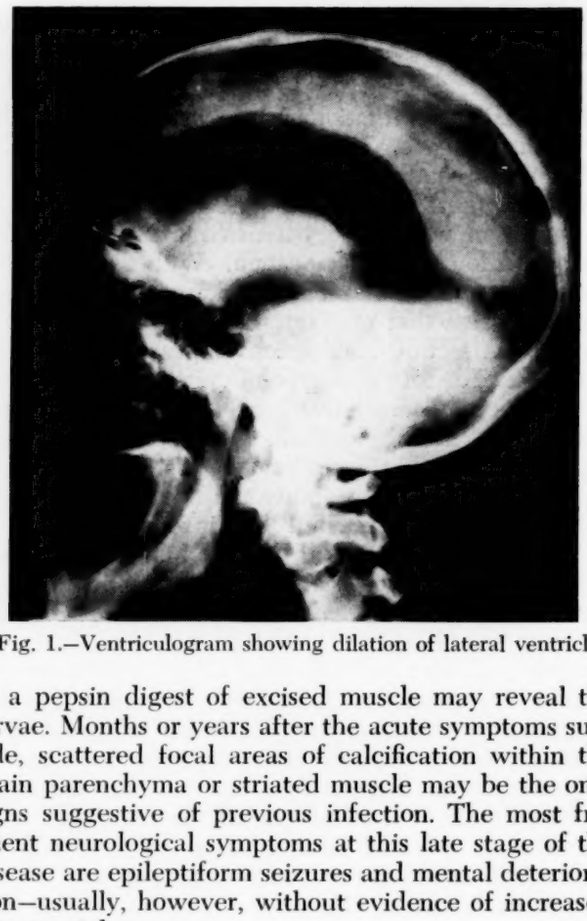

Fig. 1.—Ventriculogram showing dilation of lateral ventricles.

of a pepsin digest of excised muscle may reveal the larvae. Months or years after the acute symptoms subside, scattered focal areas of calcification within the brain parenchyma or striated muscle may be the only signs suggestive of previous infection. The most frequent neurological symptoms at this late stage of the disease are epileptiform seizures and mental deterioration—usually, however, without evidence of increased intracranial pressure.

Report of a Case

History.—A 44-year-old farmer was admitted to Charity Hospital, Tulane University neurology and neurosurgery services, on March 3, 1954, with complaints of a slowly developing muscular weakness of the lower extremities, urinary incontinence for the past month, and periodic headaches of two years' duration. In the spring of 1951 he first noticed severe left frontal headaches of an episodic nature. General physical and neurological examinations then had failed to reveal the cause, and roentgenograms of the skull were normal.

He did not seek further medical aid until the spring of 1953, at which time the severity of the headaches was markedly increased. In the interim since the spring of 1951, his family had noticed regressive changes in his personality. Spinal puncture at this time revealed a moderately elevated spinal fluid pressure, a mild pleocytosis, and a slight increase in the spinal fluid protein level. He was advised to enter the hospital but did not do so until September, 1953, at which time he refused further diagnostic studies and was discharged to the care of his physician. After this hospital visit his condition deteriorated rapidly, and he became irritable, voluble, and suspicious. He displayed defects in judgment and impairment of memory. He complained of muscular weakness of both legs and an increasing unsteadiness of gait. His condition became progressively worse, and in November, 1953, he was forced to stop work as a result of his mental and motor difficulties. In the course of the next three months he had several episodes of unconsciousness, although no convulsions were reported. In the month before his final admission in March, 1954, he became disoriented at intervals, and urinary incontinence developed.

Prior to the onset of the illness in 1951, the patient had had no serious disease. His family history was noncontributory. He had never traveled outside the state of Louisiana except into Mississippi for a brief period.

Physical Examination.—On admission to Charity Hospital on March 3, 1954, the patient was well nourished and did not appear to be acutely ill. He was fairly well oriented. His gait was ataxic. Deep tendon reflexes were normal, and no abnormal reflexes were elicited. Extraocular movements were normal. The right pupil was slightly larger than the left. Both pupils reacted well to light and had good accommodation. There was bilateral papilledema of approximately 1 D. Slight weakness of the upper and lower facial musculature on the left was present.

Laboratory Data.—Routine studies of the blood and urine showed no abnormal findings with the exception of a mild leukocytosis with a normal differential count. The Wassermann reaction was negative. Agglutination tests for typhoid, paratyphoid A and B, brucellosis, and Proteus vulgaris, strain OX 19, were negative. Roentgenographic examinations of the skull revealed no abnormalities. Electroencephalography demonstrated a small amount of generalized slow-wave activity and a prominent left frontal delta focus. It was thought that the patient had a space-occupying lesion, probably in the left frontal lobe.

First Operation.—On March 16, a ventriculogram was done through biparietal trephine openings by Dr. Murl E. Faulk. The intraventricular pressure was greatly increased. Sixty cubic millimeters of clear fluid was removed and replaced with air. X-rays showed symmetrical dilatation of both lateral ventricles (fig. 1).

Fig. 2.—Photomicrograph of cerebellum, showing large cyst containing segment of parasite. Note absence of inflammatory reaction in both leptomeninges and compressed cerebellar parenchyma. Hematoxylin and eosin stain (× 14).

The third ventricle was poorly visualized, but it was possible to detect the outline of the fourth ventricle. A bilateral Torkildsen procedure was done. The posterior fossa was explored, and polyethylene catheters were passed from each lateral ventricle into the cisterna cerebellomedullaris. No tumor was found in the posterior fossa.

Subsequent Course.—During the immediate postoperative period the patient's condition was critical, but within three days it improved remarkably. He became alert and was able to walk without difficulty. His papilledema disappeared. He continued to have a low-grade fever that had been present since surgery. The fever did not respond to either chemotherapy or antibiotics.

Six weeks after the first operation he became nauseated and vomited, and over a period of several days he became progressively more disoriented.

Second Operation.—In view of the rapid downhill course, he was returned to the operating room, and a pneumoencephalogram was performed on March 22, 1954. Air passed readily through the ventriculocisternal tubes that had been implanted at the first operation. It was impossible to outline the third ventricle in the ventriculograms. The third ventricle was explored through a right-frontal-lobe approach. Aside from symmetrical dilatation of the lateral ventricles and the anterior portion of the third ventricle, no pathological changes were demonstrated.

Subsequent Course.—After operation, the patient developed signs of medullary compression; he died on March 24, 1954, the second postoperative day. The final clinical diagnosis was of a space-occupying lesion of the mesencephalon.

Autopsy Findings.—Autopsy was performed 1 hour and 20 minutes post mortem. The body was that of a well-developed, well-nourished male measuring 5 ft., 5 in. (166 cm.) in height and weighing 130 lb. (59 kg.). The operative sites on the scalp corresponded to those described at surgery and showed no evidence of infection. Only the abnormal gross findings will be described.

The combined weight of the lungs was 1,000 Gm. The mucosa of the larynx and trachea was congested. Small emphysematous blebs were noted at the apex of both lungs. Areas of bronchopneumonia were scattered throughout all lobes. There was marked pulmonary congestion and edema. Examination of the gastrointestinal tract revealed no abnormalities except a superficial ulcer measuring 1.5 cm. in diameter on the anterior wall of the descending portion of the duodenum. No parasites were found in the gastrointestinal tract. The other thoracic and abdominal viscera were unremarkable.

Examination of the cranium and contents revealed the piarachnoid to be smooth and glistening over both cerebral hemispheres. There was marked thickening of the leptomeninges at the base of the brain, overlying the undersurface of the pons, filling the interpenduncular fossa, and extending forward to the optic chiasm.

The weight of the fixed brain was 1,300 Gm. Over the anterolateral aspect of the right frontal lobe an irregular, hemorrhagic defect was present measuring approximately 5 by 2 cm. and corresponding to the operative site. The defect extended into the anterior horn of the lateral ventricle and was surrounded by a narrow zone of hemorrhage. All sulci were narrowed, and the gyri were flattened. The basilar artery was obscured by the intense fibrosis of the leptomeninges. The entire spinal cord was not examined, but the small portion removed with the brain was not remarkable.

When the brain stem and cerebellum were removed, it was found that the leptomeninges in the region of the peduncles were 2 to 3 mm. thick and contained numerous small cysts measuring from 1 to 3 mm. in diameter. These cysts contained clear fluid and were lined by thin, shiny gray membranes. Several

Fig. 3.—Section of thalamus, showing multiple small cysts. Glistening lining membrane is body wall of parasite, which has extended from leptomeninges into the parenchyma.

cysts from 1 to 4 mm. in diameter were present around the periphery of the left cerebral peduncle. The aqueduct was completely occluded by what appeared to be clotted blood.

Multiple transverse sections through the brain stem and cerebellum revealed extensive fibrosis and thickening of the leptomeninges around the inferolateral aspects of the pons. Numerous minute cysts were present within the brain substance adjacent to the aquaeductus cerebri (aqueduct of Sylvius). Some of the cysts within the thickened leptomeninges were seen to extend into the substance of the vermis. A small cyst, approximately 1 cm. in diameter, was found overlying the left superolateral aspect of the roof of the pons. This cyst extended by continuity into the substance of the left cerebellar hemisphere (fig. 2). It was lined by a thin, pale, smooth, and glistening membrane. There was thickening of the leptomeninges around the foramens of Luschka.

Fig. 4.—Photomicrograph of cerebellum and medulla, showing extensive fibrosis of leptomeninges with caseation and thickening of arterial wall. Hematoxylin and eosin stain (× 14).

Consecutive coronal sections through both cerebral hemispheres revealed the gray matter to have the translucent appearance characteristic of cerebral edema. There were scattered focal areas of hemorrhage in the gray matter of the undersurface of both temporal lobes.

The ventricular system was dilated except for the fourth ventricle, which was normal in size. The ependymal lining was roughened and opaque. Aside from the operative defect, the internal configuration of the cerebral hemispheres was normal. Numerous cysts, varying in diameter from 1 to 5 mm., were present in a region extending from the hippocampus (Ammon's horn) medialward and involving a considerable portion of the left thalamus (fig. 3). Some of the cysts had a shiny gray lining membrane, whereas in others no distinctive lining membrane was apparent. The anteroposterior extent of the area containing the cysts in the left thalamus measured approximately 1.5 cm., and many of the cysts were in close apposition to the posterior wall of the third ventricle.

Miscroscopic Findings.—All tissues were fixed in 10% formaldehyde solution. Selected sections from the brain were stained with hematoxylin and eosin, periodic acid—Schiff stain, Masson's trichrome stain, Giemsa's stain, and Wilder's stain for reticulum fibers.

Histologically, the heart, aorta, liver, spleen, thyroid, pancreas, pituitary body, adrenal glands, kidneys, and urinary bladder were normal. The lungs showed bronchopneumonia and pulmonary edema. A purulent bronchitis was present, and an organized thrombus was noted in a small pulmonary artery. In the duodenum there was a region of peptic ulceration extending into the muscularis and surrounded by chronic inflammation.

Numerous sections through the cerebellar peduncle showed a fibrous thickening of the leptomeninges, with heavy infiltration of plasma cells and lymphocytes. The small arteries were partially

occluded by intimal proliferation. There were scattered focal areas of caseation necrosis within the fibrotic leptomeninges (fig. 4), about which a dense infiltrate of lymphocytes, plasma cells, and macrophages was present. Within the leptomeninges and extending into the brain parenchyma there were multiple cysts containing a cross section of a large parasite (fig. 5). Further observation revealed that the numerous cysts within the leptomeninges and cerebral parenchyma were lined by portions of the body wall of the parasite. Serial sections demonstrated that the

Fig. 5.—Photomicrograph of hippocampus and leptomeninges, revealing multiple cysts, three of which contain body wall of parasite. Hemotoxylin and eosin stain (× 14).

body wall of the parasite formed the lining of the cysts in the leptomeninges and then extended by direct continuity to form the lining of adjacent cystic areas in the cerebral parenchyma, thus forming the typical polycystic lesion seen in the racemose type of cerebral cysticercosis. Grossly, these cysts seemed to be separate and distinct. Many of the blood vessels in the vicinity of the parasite showed perivascular round-cell infiltration with lymphocytes and plasma cells.

A more detailed histological examination of the structure of the parasite (fig. 6) revealed the body wall to consist of three layers: (1) an outer compact cuticular layer, (2) a thin intermediate cellular layer, and (3) an internal reticular layer of varying thickness, containing relatively few cells and lining the body cavity of the parasite. Usually the meninges immediately adjacent to the parasite contained patches of caseation necrosis and granulomatous inflammation surrounded by dense fibrosis.

On microscopic examination of the cystic lesions in the brain, the histological structure of the wall of the parasite was seen to be compatible with that of a Cysticercus. No scolices or hooklets were found. The typical multicystic lesion involving the brain stem (fig. 3) and the microscopic appearance of the parasite (fig. 6) also were compatible with a racemose cysticercosis.

Similar histological findings were present in the hippocampus and the cerebral peduncle, mesencephalon, and thalamus. About some of the cysts in the cerebellum there was only a slight reaction within the leptomeninges as well as a minimal glial response of the parenchyma. Within the cerebral peduncle, intimal proliferation had partially occluded a large artery, and adjacent to this artery there was a small area of caseation necrosis surrounded by lymphocytes, plasma cells, foreign-body giant cells, macrophages, and epithelioid cells.

Sections through the cerebral cortex near the optic chiasm showed extreme fibrosis of the leptomeninges and scattered small patches of lymphocytic infiltration. Scattered islands of heterotopic glial tissue were enmeshed within the fibrotic leptomeninges. A small meningeal artery showed an obliterative endarteritis, and focal areas of encephalomalacia involving the gray and white matter were noted.

The aqueduct was obliterated by dense glial tissue in which an area of hemorrhage was present (fig. 7). A structure probably representing a degenerated fragment of the parasite was present within the region of reactive gliosis. The blood vessels surrounding the obliterated aqueduct showed perivascular infiltration with lymphocytes and plasma cells. Immediately underlying the aqueduct, within the leptomeninges, there were several large cysts that were lined by the body wall of the parasite and were surrounded by granulomatous inflammation and fibrosis.

Periodic acid–Schiff stains of tissue sections containing the parasite showed the cuticle to be Schiff-negative; the cellular layer contained few Schiff-positive nuclei, while the nuclei of the cells of the reticular layer were Schiff-negative.

Comment

The clinical features of this case were principally the typical signs and symptoms encountered with an expanding intracranial lesion, i. e., headache and papilledema. The neurological signs were not sufficiently definite to permit accurate localization. The ataxia and muscle weakness were generalized and mild, without clear-cut cerebellar symptoms of dysmetria and dysdiodochokinesia. The facial weakness was so slight as to be questionable, and the pupillary inequality was minimal, with reaction to light and accommodation intact. Thus, it would seem in retrospect that the

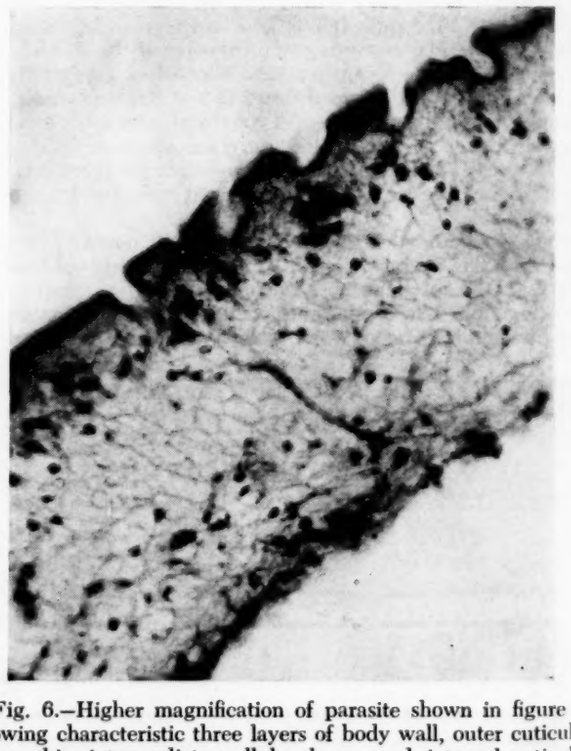

Fig. 6.—Higher magnification of parasite shown in figure 5, showing characteristic three layers of body wall, outer cuticular layer, thin intermediate cellular layer, and internal reticular layer. Hematoxylin and eosin stain (× 480).

clinical signs should have suggested a lesion involving the brain stem and cerebellum. The urinary incontinence was late in onset and may have been nonspecific, since it occurred in association with profound personality changes.

The larval form of cestodes that may invade the brain and produce lesions somewhat similar to those of cysticercosis are Echinococcus granulosus, Multiceps multiceps, and the spargana of several species of Diphyllobothrium.[10] Human infestation with the larvae of E. granulosus and M. multiceps occurs from accidental ingestion of dog feces. Human infestation with the sparganum results from consumption of water containing infected Cyclops organisms, from eating uncooked snakes and possibly other animal hosts, or from applying such animal tissue to open wounds. Histologically, the findings in this case in no way resemble those in hydatid disease, in which a characteristic laminated membrane forms the cyst wall. M. multiceps forms in its larval stage not a Cysticercus but a Coenurus. Intracranial coenuri grow to considerable size (3 cm. or more in diameter). Each Coenurus contains many scolices, which project from the wall

Fig. 7.—Photomicrograph of aqueduct, showing obliteration by glial proliferation in which an area of hemorrhage is present. Hematoxylin and eosin stain (approximately × 14).

into the cyst cavity. In cysticercosis, however, each cyst has only one invaginated scolex; in the racemose type, usually no scolex is demonstrable. Histologically, the body walls of a Cysticercus and a Coenurus are indistinguishable. Morphological differentiation of these two cestode larvae in the brain rests largely upon the size of the parasites and principally upon the presence or absence of multiple scolices. Becker and Jacobson [11] have stated that, in all cases, parasitic infestation of the racemose type occurring in the posterior fossa is due to the Coenurus form of M. multiceps rather than to cysticerci. The multicystic lesion involving the brain stem and the histological appearance of the parasite in this case are similar to those reported by Becker and Jacobson,[12] with the exception that scolices were not found in the present case. Although the cestode described in this report could not be classified specifically on morphological grounds, the absence of multiple scolices suggests that the parasite was the larva of T. solium.

Summary

A 44-year-old man died as a result of cerebral cysticercosis of the racemose type contracted in the United States. No scolices or hooklets were demonstrated microscopically, but the parasite was tentatively identified as the larva of Taenia solium. The larval form of this cestode can produce a granulomatous reaction within the leptomeninges sufficiently severe to interfere with the free flow of cerebrospinal fluid. In this case, the aqueduct was obstructed and parasitic cysts were present in the adjacent tissues, as well as in the substance of the thalamus, in the cerebellum, and in the gray matter of the hippocampus (Ammon's horn). A chronic proliferative basilar leptomeningitis was present. The resulting increased intracranial pressure produced a clinical picture suggestive of a space-occupying lesion. Cysticercosis cerebri is rare in the United States and Canada, but it should be included among the less common conditions that can give rise to the signs and symptoms of an expanding intracranial lesion.

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ELEVATED SERUM AMYLASE LEVEL ASSOCIATED WITH RUPTURED ECTOPIC PREGNANCY

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Serum amylase level determinations provide one of the most specific means of making the diagnosis of inflammatory disease of the pancreas. However, it has been well established that increased concentrations of serum amylase may be produced, perhaps indirectly, by a variety of other conditions not associated with intrinsic pancreatic pathology. The list of such conditions is long and includes perforated peptic ulcer, peritonitis, acute gallbladder disease, choledocholithiasis, biliary dyskinesia, dissecting aneurysm of the aorta, pneumonia, bronchogenic carcinoma, intestinal obstruction, uremia, and mumps (whether or not pancreatitis is present).[1] They may also occur after the injection of morphine or codeine. In these conditions, however, the levels of serum amylase are rarely of the same magnitude as those attained in the early phases of acute pancreatitis, and they usually do not exceed 400 [1b] to 600 [2] Somogyi units.

In the case to be described, much higher levels of serum amylase were found in association with a ruptured ectopic pregnancy. The protean nature of the clinical picture in this disorder as well as in acute pancreatitis makes this finding of considerable importance to all clinicians dealing with abdominal emergencies.

Report of a Case

A 22-year-old Negro woman, with a chief complaint of abdominal pain of three days' duration, was admitted to the Strong Memorial–Rochester Municipal Hospitals. The patient gave a most confusing and unreliable history. As well as could be determined, she had been experiencing crampy, generalized abdominal pain of slowly increasing severity for three days. The only associated symptoms were weakness, nausea, belching, and vomiting. She was unable to give satisfactory information regarding her menstrual periods, but thought that menstruation for the present month was four or five days overdue. The patient was afebrile and, except for a pulse rate of 130 beats per minute, the vital signs were normal. She appeared acutely ill and was writhing about in bed complaining of severe abdominal pain. The scleras were not icteric. The abdomen was rigid and extremely tender to palpation, with signs of peritoneal irritation. There was no leukocytosis. Urinalysis showed no abnormal findings.

The cause of this abdominal emergency was not immediately apparent. A serum amylase level determination was made, using the Somogyi technique, and showed a marked elevation to 1,600 Somogyi units. The normal value for our laboratory rarely exceeds 200 Somogyi units. The serum alkaline phosphatase level was 26 Bodansky units (normal, 2 to 4.5). The blood for these determinations was obtained eight hours after a subcutaneous injection of morphine sulfate, 0.01 Gm., and atropine sulfate, 0.0003 Gm., had been given. A serum amylase level determination made 15 hours after the injection showed 1,620 Somogyi units. At this time the patient's abdomen was more distended and signs of acute blood loss had developed. A posterior colpotomy revealed grossly bloody peritoneal fluid. The serum amylase level of this fluid was 1,180 Somogyi units.

The patient was taken to the operating room immediately and an exploratory laparotomy was performed by Dr. George Trombetta. Two thousand cubic centimeters of blood was present in the peritoneal cavity. The source of the bleeding was a ruptured ectopic pregnancy on the right. A salpingectomy was successfully done. The gallbladder appeared normal. Palpation of the liver and pancreas revealed no abnormal findings. A total of 3,000 cc. of blood was administered prior to and during the operative procedure. The patient had an uncomplicated postoperative course and made an uneventful recovery. No further narcotics were administered.

On the day following operation the serum amylase level was still markedly elevated, at 1,680 Somogyi units. The serum lipase level was 0.24 cc. (normal, 0.2 to 1.5), and the serum alkaline phosphatase level had fallen to 4 Bodansky units. On the second and fourth postoperative days, the serum amylase level decreased to 414 and 460 Somogyi units, respectively, but it rose to 980 on the fifth postoperative day (see figure). After this there was a progressive decline to almost normal levels.

The patient denied having had any previous bouts of abdominal pain or other symptoms suggesting pancreatitis. No calcifications were seen in a plain roentgenogram of the abdomen. An oral cholecystogram showed good concentration of dye and was interpreted as normal. A glucose-tolerance test, with 100 Gm. given by mouth, was normal. A mumps complement-fixation test showed no significant titer, and there was no increase in titer on a return visit of the patient two months after the hospital admission. No excess fat or starch in the stool could be demonstrated.

Two weeks after operation, the serum amylase level was 360 Somogyi units. There was no rise in level after a subcutaneous injection of morphine sulfate, 0.01 Gm., was given as a test. The patient was completely asymptomatic on discharge, 21 days after the operation.

One year later she was again admitted to the hospital for marsupialization of a Bartholin gland cyst. There were no gastrointestinal complaints. The serum amylase level was 300 Somogyi units. Two years later the patient was seen in the outpatient department for a rectal complaint. She denied having abdominal pain or other symptoms of pancreatitis, and stated that she "felt fine." Physical examination was unremarkable. The serum amylase level was 110 Somogyi units.

Comment

The frequent difficulty encountered in making the diagnosis of ectopic pregnancy is well known. It has been said [3] that "the factor most typical of these patients is their atypical clinical picture." When a clear history cannot be obtained, the problem is even greater. Among the abdominal emergencies which may be mimicked are acute pancreatitis and the hemolytic crisis of sickle-cell anemia,[4] both of which were considered in the patient described in this report before the diagnosis became obvious after posterior colpotomy. High levels of serum amylase compatible with acute pancreatitis such as were observed in this patient apparently have not been described previously in cases of ectopic pregnancy.

Serum amylase is derived primarily from the pancreas and to a lesser degree from the liver, salivary glands, and possibly other glands.[5] An increase in circulating enzyme is thought to be due to backpressure within the pancreatic ductal system, with retrograde passage of the enzyme through the capillaries into the blood stream.[6] The mechanism responsible for the high levels of serum amylase in this patient, who had no demonstrable evidence of intrinsic pancreatic disease, is not clear.

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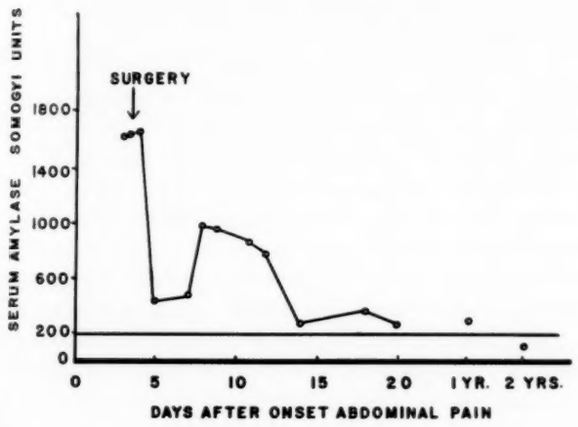
Lewison[7] found "mild but persistent increase in serum amylase activity in a patient treated surgically and found to have a ruptured Graafian follicle." In 37 patients with other gynecologic conditions, however, normal serum amylase values were found.

The effect of morphine in occasionally causing increased serum amylase levels, by virtue of its spasmogenic action on the sphincter of Oddi and its contiguous musculature, is well recognized and has been studied intensively by several groups of investigators.[8] Although the subject is still somewhat controversial, the view is held by some[9] that, for an opiate to produce an increased serum amylase level, it is necessary to have stimulation of the extrinsic secretions of the pancreas by either a meal or administration of secretin, in addition to the excitant action of the opiate on the sphincter of Oddi.

The patient described in this report did not eat for at least 36 hours prior to administration of the single dose of morphine given, so there was no alimentary stimulation of pancreatic secretion. There was also a substantial rise in the serum amylase level to 980



Serial serum amylase determinations in a 22-year-old woman with a ruptured ectopic pregnancy.

Somogyi units five days after the operation, without further administration of narcotics. Furthermore, no increase in serum amylase level developed after a test injection of 0.01 Gm. of morphine sulfate two weeks after the operation. The patient had no evidence of impaired renal function, which may cause increased levels of serum amylase due to a decrease in urinary excretion of the enzyme.[1c]

Generalized peritonitis may also cause a rise in the serum amylase level, possibly because of secondary inflammation of the pancreas.[1c] However, a rise due to absorption of amylase from the digestive ferments released into the pertoneal cavity, such as occurs with a perforated peptic ulcer, is another mechanism which has been suggested to explain this phenomenon.[10] The effect of peripancreatic inflammation as well as of absorption of enzymes from the peritoneal cavity on serum amylase levels has been the subject of experiments on dogs,[11] with the latter theory perhaps gaining adherents in recent years. In our patient there was only blood contaminating the peritoneal cavity, making the idea of absorption of amylase from this site unimportant. It seems possible that peripancreatic inflammation due to the blood may very well have occurred. Raffensberger[1c] found mild elevations of serum amylase levels in two patients with stab wounds of the abdomen without perforation of the intestine and in one patient with hemoperitoneum. The highest value was, however, only 405 mg. per 100 cc.

A possible explanation, and a not entirely convincing one, for the substantial elevations in serum amylase level found in the patient described in this report is that secondary inflammation of the pancreas occurred due to blood released from the ruptured tube, with spasm of the sphincter of Oddi caused by administration of morphine playing a contributory role.

Summary

High concentrations of serum amylase, compatible with acute pancratitis, were found in a patient with a ruptured ectopic pregnancy. There was no evidence of intrinsic pancreatic disease. Two years after the ectopic pregnancy, the patient was in good health, with no abdominal pain and a normal serum amylase level.

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COUNCIL ON FOODS AND NUTRITION

Report to the Council

The following paper was presented at the symposium, "The Relation of Proteins and Amino Acids to Human Nutrition," in Los Angeles, May 21, 1956. This symposium was sponsored by the Council on Foods and Nutrition, with the cooperation of the Los Angeles County Medical Society and the School of Medicine, University of California at Los Angeles. This report is the third of the series, the others of which appeared in THE JOURNAL, *May 11 and May 18. After publication of the sixth and final report, this series will be available in monograph form.*

PHILIP L. WHITE, SC.D., *Secretary.*

AMINO ACID AND PROTEIN REQUIREMENTS OF INFANTS

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Man has been practicing nutrition since his appearance on this earth; yet in spite of this long interest in and association with foods, our present knowledge of human nutrition is limited. A great deal of prejudice, faddism, and crooked, illogical thinking clouds the whole field of nutrition. This state of uncertainty is in large measure unavoidable; it results from the complexities of the evaluation of nutrition, particularly in humans.

Nutrition plays an important role in pediatrics. Here physicians have a real opportunity to influence the eating habits and, therefore, the health of the nation. The cardinal principle of pediatric nutritional education is to make the eating of a wide variety of natural foodstuffs a pleasurable experience for the child and also for his mother. It is largely our ignorance of every essential food factor and our inability to specify adequate amounts of the known ones that make this principle a prerequisite for adequate nutrition at the present time.

Problems in Nutritional Experimentation

In order to appreciate the difficulties inherent in nutritional experimentation, let us briefly consider some of the steps that are essential in the evaluation of medical evidence.[1] A clear statement of the problem is necessary, but in nutrition is it possible to agree on the definition of such terms as "a minimal requirement," "optimal allowance," or "optimal nutrition"?

The samples studied must be truly comparable in all relevant features. We know that the previous nutritional history and the initial nutritional state of the subject do affect the results of feeding experiments. The control of such factors in human subjects is understandably difficult. The allocation of subjects to different diets by random selection should be practiced in nutritional experiments.

In the "ideal" experiment a single variable can be manipulated at a time, but in nutritional experiments this is particularly difficult to achieve. Alterations in the composition of a diet with respect to amounts and types of carbohydrates, fats, minerals, and vitamins are known to influence the results. Uncontrolled intakes of food are frequently influenced by psychic factors that must be controlled in feeding experiments, especially in children.

In any experiment there should be a clear-cut method of assessment. In nutritional experiments what criteria are we to choose in assessing the results? Concerning protein nutrition, the limitations of the nitrogen balance method are well known. Gain in weight, since it may be due to the accumulation of fat, water, or protoplasm, may not serve as an adequate means of assessing the value of varying protein intakes. The chemical analysis of the whole body composition is not a feasible method of assessment when applied to humans. Increments of linear growth are useful if accurate measurements are taken and if other factors affecting growth can be controlled.

Before proposing a cause-and-effect relationship between the manipulated variable and the results observed, the results should be compared with the role that may have been played by chance or associated variables. Thus we see that even in a simple nutritional experiment the "experimental design" must be very carefully thought out. There is need for consistent definitions, uniform standards of assessment, and restricted interpretations of the data throughout much of the field of nutrition.

In the United States the problem of protein nutrition in infancy is different from that found in many parts of the world. Even today, the World Health Organization and the Food and Agriculture Organization consider the problem of protein nutrition first in order of urgency, especially in the construction of diets suitable for infants and children in the postweaning period. The interpretation of protein needs in terms of constituent amino acids is basic for an understanding of protein nutrition in health and for intelligent correction in defective dietary situations.

The intake of protein, as of most substances, is perhaps best viewed in the light of minimal requirements and maximal tolerated amounts. The upper limit of protein intake is determined largely by the size of the renal water requirement imposed by the high solute load that results from a high protein intake.[2] The high-

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er the protein intake the larger the renal water requirement at any given urinary concentration. In general, in the United States there is no need to know the minimal requirement of protein or amino acids for routine infant feeding; however, such knowledge is basic in planning food programs in areas with scanty supplies of dietary protein or in clinical situations in which the capacity to handle food is limited by illness or other conditions. In these circumstances it is desirable to eliminate nonessentials in order to make room for the essential quantities of other substances. This is particularly true when nourishment is given parenterally. In addition, the knowledge of the amino acid requirements of healthy infants is necessary before a study can be made of these requirements as altered by disease. Finally, because of current propaganda for supplementing diets with individual amino acids, the amino acid requirements for infants should be considered.

Amino Acid Requirements in Infancy

A number of approaches to the determination of the amino acid requirements of infants are available. One may use natural proteins that, by anaylsis, have been shown to be deficient in some particular amino acid. Nature, however, has been singularly unobliging in providing a variety of such proteins. In addition, the use of these incomplete natural proteins may introduce other amino acid imbalances in the diet. One may use proteins in which individual amino acids have been degraded by chemical or other means. The disadvantage of this method is that the nature and possible effects of the degraded fragments are unknown. Apparently reasonable requirements for tryptophan, isoleucine, and the sulfur amino acids have been obtained by Albanese and co-workers [3] by these methods.

A synthetic diet in which the protein is replaced by an amino acid mixture may be used. The advantage of these mixtures is that the ingredients are accurately known, although their absorption rates may be different from those of amino acids liberated from proteins. In some studies the DL forms of the amino acids have been used, leading to uncertainties about the utilization of the D forms or their possible ill-effects on metabolism; in some diets the nonessential amino acids have been omitted. The imposition of the synthesis of nonessential amino acids from the essential amino acids may or may not represent physiological economy.

These difficulties and sources of error can be avoided by giving a diet in which the protein moiety is replaced by a mixture of pure amino acids, both essential and nonessential, all in the form of the natural optical isomers. Such a synthetic diet has been used,[4] and its composition is shown in table 1. The amino acids were present in the diet in the same proportions as those found in human milk. The data for the amino acid composition of human milk were taken from the tables of Macy and from the analyses of two samples of pooled mature human milk analyzed by column chromatography.[5] This synthetic diet maintained normal growth in rapidly growing premature infants over periods of several days.

In these experiments, infants, believed by all usual criteria to be in good health, were fed the full synthetic diet. An individual amino acid then was generally reduced in amount or removed completely from the diet, and gradual increases in the quantity of the amino acid under consideration were made. The nitrogen content of the diet was kept constant by adding equivalent amounts of glycine. The patients were studied in the metabolism ward under the close supervision of clinicians and nurses specializing in metabolism. The criteria of adequacy or inadequacy of a given amount of an individual essential amino acid were (1) alteration in the rate of weight gain, (2) change in the level of nitrogen balance, (3) analysis of the serum proteins, and (4) analysis of 24-hour specimens of urine for nitrogen and for amino acids by column chromatography.

Threonine.—The threonine requirements of eight patients ranging in age from 2 weeks to 4½ months were studied. The requirements of two patients seemed to be met with 50 mg. per kilogram of body weight per day, but the requirement of one patient appeared to be slightly above 60 mg. of threonine per kilogram per day. It was felt that the usual requirement for threonine could be regarded as roughly 60 mg. per kilogram of body weight per day.[4a]

TABLE 1.—*Composition of Experimental Diet*

	Gm.	% of Total Calories
L-Amino acid mixture	100	12
L-Alanine	2.67	
L-Arginine	4.58	
L-Aspartic acid	8.78	
L-Cystine	2.14	
L-Glutamic acid	17.56	
L-Glycine	2.06	
L-Histidine	1.76	
L-Isoleucine	6.11	
L-Leucine	11.76	
L-Lysine hydrochloride	7.10	
L-Methionine	1.68	
L-Phenylalanine	4.89	
L-Proline	6.11	
L-Serine	5.34	
L-Threonine	4.58	
L-Tyrosine	4.58	
L-Tryptophan	1.68	
L-Valine	6.64	
Hydrogenated vegetable fat	160	43
Dextrimaltose	375	45
Mineral mixture	22.3	
Vitamin B mixture	10.0 ml./day	
Vitamins A, C, and D*	0.6 ml./day	

* Supplied as Tri-Vi-Sol by Mead Johnson & Company.

Phenylalanine.—In a similar manner, the phenylalanine requirements of six patients ranging in age from 1 week to 9 months were studied. By the criteria used, it was found that approximately 90 mg. per kilogram of body weight per day was the minimal phenylalanine requirement for these infants.[4b]

Lysine.—More recently Snyderman and associates [4c] have extended these observations to the essential amino acid lysine. In a study of six infants they found the minimal requirement to be approximately 90 mg. per kilogram of body weight per day.

Comment.—The values obtained by the method outlined seem reasonable on the basis of the consistency of changes in weight gain and nitrogen balance of all subjects. The values for infants seem reasonable in the light of those obtained by Rose [6] for men and Leverton [7] and Jones [8] for women. When calculations are made from the rather sketchy data available for infants fed measured amounts of human milk, the

amounts of threonine, phenylalanine, and lysine calculated to have been ingested in human milk are more than the amounts required in the preceding experiments.

Recently Snyderman and co-workers [9] performed studies in which the quantity of protein, derived from cow's milk, was reduced in the diets of infants. The calories were replaced by carbohydrate and fat until a limit was found that would reduce normal weight gain. It was noted that protein from cow's milk could be reduced to as low as 4% of the total calories if an additional amount of nitrogen were provided by glycine or urea. On the lowest protein intakes with a glycine or urea supplement, the lysine, phenylalanine, and threonine intakes were of the same order of magnitude as the minima in the previously mentioned amino acid requirement studies.

Obviously, these experiments under quite artificial circumstances have many limitations. The requirements determined for the three amino acids probably would not be adequate if different criteria of adequacy were employed. They might well be altered if there were changes in the proportions of the amino acids, fats, carbohydrates, or vitamins employed in the diet, as well as any change in activity, rate of growth, or state of health of the patients. In addition, the small number of individuals studied does not allow for prediction of individual variations. Table 2 depicts the preliminary, tentative values for the amino acid requirements of infants as studied so far.

TABLE 2.—*Tentative Minimal Requirements for Essential Amino Acids During Infancy*

Amino Acid	Mg./Kg. of Body Weight/Day
Tryptophan	30
Isoleucine	90
Sulfur-containing amino acids	85
Threonine	60
Phenylalanine	90
Lysine	90

Supplementation of Diets with Single Amino Acids

One should be wary of amino acid supplementation of diets without considerable thought and investigation of both the need for such supplementation and, particularly, the safety of such a procedure. In the adults studied, a deficiency of any one of the essential amino acids led to symptoms of anorexia, fatigue, and increased nervous irritability. In the infants, failure of weight gain was regularly observed. These common symptoms, which are in no way specific for amino acid deficiencies, occur in people with many other types of disability. Since we all occasionally lose our appetite and suffer from fatigue or nervous irritability, and since an unsatisfactory rate of weight gain is a comon pediatric complaint, one can see that there could be a tendency to exploit these symptoms and to begin adding amino acids to practically all foods.

This already is being done with lysine. The theoretical basis for this need is the assumption of a high value for the minimal requirement of lysine in infants.[10] This was determined by a method of questionable validity and resulted in the estimation of a minimal requirement of 170 mg. of lysine per kilogram of body weight per day, which is greater than the amount of lysine usually ingested daily in human milk and in some of the satisfactory low-protein infant foods made from cow's milk. It is much greater than that in the 4% protein diets supplemented with glycine or urea.[9] The minimal lysine requirement determined by Snyderman and others [4c] is about one-half of this value. One investigator has postulated that the total amino acid requirement of an animal of any age or species is determined by the proportions of the essential amino acids contained in the tissues being formed or metabolized. There is no evidence that the amino acid composition of the tissues being formed or metabolized in infancy differs remarkably from that in adults. The experimental evidence suggesting the need for lysine supplementation is based on a study of 15 infants and children with unspecified types of illness. Their changes in weight and in serum protein and hemoglobin concentrations were variable. This might be expected in an uncontrolled heterogeneous group. Hence, the results in the only published study of the rectification of growth failure by lysine supplementation are difficult to assess.[11]

Deleterious effects resulting from the addition of an excess of an individual amino acid have been reported. Amino acid imbalance is readily produced in tissue cultures, in animal experiments,[12] and in human beings. Therefore, it would seem highly undesirable to use such supplementation of proteins until more impressive evidence of their value and their safety has been produced.

Summary

Our knowledge of protein nutrition in humans is scanty and uncertain, largely because of the inherent difficulties in the evaluation of human nutrition. Therefore, those who must interpret nutritional experiments and give advice about diets to patients must exercise considerable caution. The present lack of knowledge makes it mandatory that pediatric patients be taught to enjoy eating a wide variety of natural foodstuffs. A plea is made for valid evidence before the procedure of supplementing proteins in the diet with individual amino acids is accepted.

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FATS IN THE DIET

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Report to the Council

The Council has authorized publication of the following report.

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The significant increase in life expectancy in the United States and the growing percentage of the total population in the over-65 age group have intensified interest in the nutritional problems of the aged. Although it is doubtful if fundamental distinctions exist between nutritional requirements in middle and in advanced age, the distressing incidence of arteriosclerosis, coronary thrombosis, and cerebral vascular accidents has nevertheless raised questions about the possible relation of these diseases to the dietary habits of older adults and to the composition of common foods.

Lipids are frequently designated as dietary culprits, and, in some circles, the terms "fat" and "cholesterol" have become synonymous with atherogenesis and diaster. How much is an optimal quantity of fat, and what should be its chemical nature? The fact that precise answers cannot be given to these fundamental questions emphasizes the urgent need for the reexamination of the role of lipids in nutrition.

There can be no doubt about the physiological importance of fats. The neutral fats are triglycerides of common fatty acids. The high caloric density of fat and its insolubility in water make it superior to both glycogen and protein for the storage of energy, in both animals and plants. Moreover, the deposition of fat in animals as adipose tissue insulates the body against rapid changes in environmental temperature and physically cushions organs and the body as a whole against external forces.

That fat is not a foreign material in the body is indicated by the elaborate enzymatic and hormonal mechanisms that control its chemical transformations. The interrelationship of these mechanisms with those concerned with the metabolism of sugars and amino acids suggests that the utilization of fat as a fuel is the usual, not the unusual, biochemical event. Actually, much evidence exists to support the view that the intermediate products of fatty acid metabolism serve as the primary fuel of resting muscle. It is significant also that fat is synthesized by mammary tissue and that it is quantitatively the most important source of energy in milk.

Fats are widely distributed among common foodstuffs. They add acceptability to meals; certain ones provide the essential fat-soluble vitamins, and their digestion and absorption make possible the intestinal absorption of these same vitamins.

Storage fat may originate directly from food fat or indirectly from the conversion of dietary carbohydrate to fat. During any 24-hour period starch, sucrose, lactose, and glucose are assimilated through the digestive tract and are either burned or become, temporarily, blood glucose, liver or muscle glycogen, or tissue fat. In a normally nourished individual a portion of the day's intake of carbohydrate is converted to fat. If the individual is in caloric balance, this fat is burned between meals and during the night, and none is left in the tissues. If the individual's caloric intake is excessive, his energy needs are satisfied without using all of the fat, and adipose tissues increase in amount.

Fat formed from food carbohydrates in animals is largely a mixture of the triglycerides of palmitic, stearic, and oleic acids. These fatty acids predominate in butter fat, the fat of milk, and in the fat obtained from adipose tissue of farm animals. Palmitic and stearic acids are saturated, whereas oleic acid is unsaturated, having one double bond in its carbon chain. Tissue fats of animals may contain variable amounts of the triglyceride of linoleic acid if the fat trilinolein is present in the diet. Linoleic acid, which is doubly unsaturated, either is not synthesized or is only slowly synthesized in animal tissues.

In contrast to palmitic, stearic, and oleic acids, which, although useful, are dispensable in the diet, linoleic acid may be an essential nutrient. It is an integral part of important tissue constituents such as lecithins and esters of cholesterol. From a practical viewpoint, it is the dietary precursor of arachidonic acid, the polyunsaturated fatty acid that is indispensable to many animal species. Although evidence for the essential role of linoleic and arachidonic acids in

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human diets needs further corroboration, prudence favors their provisional inclusion in the group of nutrients required by man.

The problem of the nutritive value of the triglycerides of common fatty acids is complicated by the fact that man uses appreciable quantities of triglycerides of other and unnatural fatty acids in his diet. This happens because of the commercial hardening of plant oils by the process of hydrogenation. This procedure not only forms saturated bonds from unsaturated bonds but also may transform the natural "cis" isomers to unnatural "trans" isomers. The latter have higher melting points but remain unsaturated. Other unnatural isomers may result from a shifting of the double bonds along the carbon chain. At the present time it is virtually impossible to describe chemically some of the commercial hydrogenated plant oils because of their complexity.

Some plant oils such as corn, cottonseed, safflower, soybean, and peanut oils are rich sources of trilinolein. As noted before, hydrogenation replaces a significant part of the linoleic acid with stearic acid and with unnatural, unsaturated fatty acids. Arachidonic acid occurs in small amounts in some animal fats. Olive oil, although unsaturated, is a poor source of linoleic acid; coconut oil, a plant fat, is saturated. Chicken fat is an unusual animal fat because of its relatively large content of linoleic acid; fish oils are highly unsaturated and are characterized by other polyunsaturated fats in addition to some trilinolein. These illustrations demonstrate the need of a more definitive terminology in describing the fatty acids in natural and in processed fats than is afforded by the general terms, animal or plant, hard or soft, saturated or unsaturated, and low iodine or high iodine number.

Considerable evidence exists to show that, under certain circumstances, sources of linoleic acid may lower elevated serum cholesterol levels in man. The evidence favors the concept that essential unsaturated fatty acids are required for the normal transport of cholesterol as lipoprotein and, possibly, phospholipid complexes. Clarification of the circumstances under which hypercholesteremia can be prevented, however, remains to be delineated. Valid experimentation has not yet determined the relative influence on serum cholesterol of surplus dietary calories, of an excess of the total dietary fat, of abnormal ratios of linoleic acid to other fatty acids in the diet, or of numerous other nutritive factors that may influence adversely the physical and chemical characteristics of lipids in the blood and in the walls of the vascular system. Until a clear-cut solution of the problem of the prevention of arteriosclerosis and of its sequelae is forthcoming, it seems wise to assume that a faulty diet may be one of the causative agents. Whether or not dietary fat is, in some fashion, the culprit remains to be proved. In the meantime, one may recommend the dietary control required to attain and maintain optimum body weight and the choosing of a varied diet containing adequate amounts of those foods, including fats, shown by experience and by experiment to have special nutritive value.

COMMITTEE ON COSMETICS

Report to the Committee

The following paper was presented at the symposium, "The Rational Use of Cosmetics in Medical Practice," in Chicago, June 13, 1956. This symposium was sponsored by the Committee on Cosmetics, in cooperation with the Section on Dermatology, at the 105th Annual Meeting of the American Medical Association. This is the third in a series of papers, the others of which appeared in THE JOURNAL, *March 2, page 740, and March 16, page 943.*

VERONICA LUCEY CONLEY, *Secretary.*

ACTION OF EMOLLIENT CREAMS AND THEIR ADDITIVES

I. H. Blank, Ph.D., Boston

Some confusion exists among physicians, pharmacologists, and cosmetic chemists as to just what constitutes an emollient. For the purpose of this discussion, an emollient is defined as any externally applied material that tends to prevent or counteract the symptoms and signs of dryness of the skin. Very mild dryness may be apparent only as superficial scaling of the skin, but severe dryness may be accompanied by considerable scaling, fissuring, inflammation, pain, or itching. If emollients and dryness are so defined, it becomes apparent at once that the emollient creams and lotions produced by the cosmetic manufacturer and the simple emollient ointments and lotions prescribed by the physician have much in common. Their functions are the same. The cosmetic manufacturer and the physician probably can learn from each other.

The majority of emollients, cosmetic or pharmaceutical, are mixtures of an oil and water. In addition, an emulsifying agent is used to keep the oil and water well mixed, and a perfume may be added. Any one or more of a large variety of oils may be used. If the oil has a low melting point, the emollient will feel greasy

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on the skin; if it has a high melting point, the residual oily film will not feel greasy. Because it does not feel greasy, and because, as it is rubbed onto the surface, its color probably changes from white to colorless, it seems to "vanish." The external, continuous phase of the emollient may be either oil or water; that is, the emollient may be either a water-in-oil or an oil-in-water emulsion, depending on the type of emulsifying agent used. When the continuous phase is oil, water is the dispersed phase and vice versa.

After these emollients are applied to the cutaneous surface, some of the water may be taken up by the stratum corneum, but most of it evaporates into the air. The nonvolatile oil of the emollient remains on the skin. It has been assumed, therefore, that the residual oily layer serves as a "lubricant," since most of the emollients have the physical characteristics of lubricants. In order to act as a "lubricant," the oil should locate between the lamellas of the stratum corneum, thus allowing the lamellas to slip over one another and permitting the skin to flex without breaking the stratum corneum. With this in mind, attempts have been made to find oily substances that would penetrate the stratum corneum. Lanolin and lanolin mixtures have been said to penetrate the skin better than do other oils, particularly petrolatum.

Indeed, lubrication might be one of the mechanisms by which emollients act, but it does not seem to be the major mechanism involved. It can be easily shown that neither an externally applied oil nor the natural oils can keep the stratum corneum flexible without the aid of water.[1] If the cornified epithelium (a piece of callus or the top of a sunburn blister) is removed from the skin and allowed to lose its water but none of its natural oils, it becomes inflexible and brittle. Immersion of this dry, brittle cornified epithelium in various anhydrous oils for long periods of time, even two or three years, will not make the cornified epithelium flexible again. If the brittle callus is immersed in water, however, it becomes quite flexible in a very short time. Currently, water is the only known plasticizer for keratinized tissue.

The application of a film of oil to the cutaneous surface relieves the symptoms of dryness, however. This film functions in two ways. First, the oil replaces a roughened, scaly surface with a smooth film, and small spicules of cornified epithelium, which extend above the surface and produce roughness, are "cemented down." Thus, the cutaneous surface seems smoother. Second, and more important perhaps, if the oily films are occlusive, they will retard the evaporation of water from the cutaneous surface and help keep the stratum corneum hydrated and flexible.

The natural lipid film on the surface is not an occlusive barrier, and the major barrier in the skin is below the stratum corneum. Winsor and Burch [2] showed that the natural lipids do not prevent water loss to the environment, and Rothman [3] stated that it is not difficult to get water into the stratum corneum from the environment through whatever lipid film there is on the surface. In 1924, Rein [4] pointed out that the stratum lucidum and stratum granulosum are responsible for the impermeability of the skin to electrolytes. Later Rothman [5] stated that, at this same anatomic position in the skin, the *Übergangsschichten* act as the barrier against the penetration of water molecules because the proteins in these layers are buffered at a pH corresponding to their isoelectric points and therefore take up a minimum quantity of water. Szakall [6] showed that it is necessary to strip intact human skin six times with adhesive tape before the barrier is broken sufficiently to allow water to escape rapidly enough to produce a moist surface. Quantitative measurements of the rate of water loss through pieces of excised human skin, which have been stripped various numbers of times, have been correlated with histological sections of the stripped skin and support the hypothesis that the major barrier against diffusion of water molecules is near the base of the cornified epithelium.[7]

Thus, since the surface film of natural lipids is not an adequate barrier to prevent loss of water from the stratum corneum and because there is a barrier between the cornified epithelium and the underlying moist tissues, the cornified epithelium loses water to the environment more rapidly than it receives water from the underlying tissues. It tends to dry out, but fortunately it is a hygroscopic material and does not dry out completely in atmospheres of normal or high relative humidity; however, when the relative humidity is low, as during the winter months, the stratum corneum may dry out, become brittle, and break or scale when flexed unless it is adequately protected by a film of occlusive oil. The action of the simple emollients, therefore, is primarily a surface phenomenon, and possibly the importance of the penetration of the oil into the skin has been overemphasized. An effective emollient must be so constituted that it will help the stratum corneum maintain an adequate water content.

It is at once apparent that the thicker the stratum corneum, the less flexible it will be if and when it becomes dehydrated. Not only does the water content of the stratum corneum influence the condition of the skin, but the thickness of the cornified epithelium also plays a role. When the stratum corneum becomes thicker, the symptoms of dryness increase. Physical stimuli such as friction and exposure to ultraviolet radiation, chemical stimuli, and certain pathological states thicken the stratum corneum. On frequent exposure to warm solutions of a soap or detergent, the skin receives both physical and chemical stimuli. Such a process might evoke thickening. If thickening is abnormal because of an added external stimulus, it may be corrected just by removing this stimulus, but, if it is abnormal because of some diseased state and abnormal keratinization, correction may be much more difficult.

Vitamin A

Some evidence suggests that vitamin A alters keratinization. Fell and Mellanby [8] and Weiss and James [9] have shown that keratinization of epidermal cells from the chick embryo growing in tissue culture can be completely suppressed by the use of vitamin A. Flesch [10] has shown that ethers and esters of vitamin A inactivate sulfhydryl groups of mouse liver homogenates and the sulfhydryl enzyme dehydrogenase and cause hair loss when externally applied to mice. Other investi-

gators [11] have stated that large oral doses of vitamin A correct the abnormal keratinization in such diseases as keratosis follicularis, keratosis pilaris, and ichthyosis.

Reasoning that this effect is exerted directly on the end-organ and that therefore systemic administration would not be necessary, some physicians have applied vitamin A topically, and cosmetic manufacturers have used this vitamin occasionally in emollient creams.

There is fairly good evidence [12] to prove that vitamin A can penetrate normal, intact animal skin, and Mandelbaum and Schlesinger [13] indicate a systemic effect after external application in humans. It is probable that it penetrates intact human skin slowly and that only a small portion of the amount applied reaches the granular and Malpighian layers of the epidermis where any faulty keratinization might be corrected. There is still little evidence, however,[14] to show that abnormal keratinization in skin diseases is altered by the external application of a vitamin A ointment any more than it would be altered by the application of the vehicle alone. Very little evidence has been found to show that the use of cosmetics containing vitamin A is any more beneficial for controlling symptoms of dryness than are simple emollient creams not containing any vitamin A. In support of this statement, a representative of the cosmetic industry, in 1954, commented on a paper by Conley [15] and said, "I agree with our able contemporary that there is some boloney being handed out in publicity on the need for and value of vitamins in skin creams. . . .

"Whether the vitamins help the skin or not is something that clinical trials can establish easily enough. So it is hoped the industry has done the work, or if not, it should get started. Methinks we have loads to learn about the skin." [16]

Estrogens

In discussing estrogens, perhaps it is not justifiable to ask whether they function only by increasing the emollient action of a cream. The estrogens are said to cause hydration of the skin, but this refers to hydration of the dermis and not of the stratum corneum. They are supposed to delay or reverse some of the changes that occur in the skin during normal aging, only one of which is dryness. During aging, there are changes in both the epidermis and dermis. The epidermis and stratum corneum do not become thicker with age; if they change at all, they become thinner. There may be a decrease in the activity of the sebaceous glands, and less sebum may be produced. As has already been indicated, however, the sebum is probably not the major factor in skin dryness. Some atrophy occurs in the skin of elderly people; the entire skin feels thinner, and it is less elastic and less resilient. Many elderly people describe their skin as "dry." The question arises as to whether these changes are reversible and whether they can be prevented. From what is known of the action of simple emollients, it would appear that they could not prevent or reverse such changes in the aging skin.

It is easy to understand why estrogens have been added to simple emollients in an attempt to control aging of the skin in women, for these changes in the skin occur at a time when the normal production of estrogen decreases. Other physiological changes also occur at menopause, and it is asked whether simple replacement of estrogen will control the cutaneous changes, and, if so, whether this replacement can be accomplished by topical application of estrogen.

It seems reasonably well established that estrogens can penetrate normal human skin.[17] Because this is true, undesirable systemic effects from the topical application of estrogen creams might occur. Scattered reports in the literature, such as that of Goldberg and Harris,[18] seem to support this point of view. However, there is a dearth of evidence concerning the absolute rate of penetration of estrogen through normal and abnormal skin from various concentrations of estrogen in different types of vehicles. More evidence is needed. Most estrogen creams currently available do not contain more than 10,000 I. U. of estrogen per ounce. When such creams are used according to directions, they appear to be free of any abnormal systemic effects.[19] There is probably a factor of safety in a cream of this concentration. Peck, Klarmann, and Spoor [20] state that concentrations of estrogens in excess of 50,000 I. U. per ounce may produce undesirable systemic effects. Early fears of carcinogenic action of these cosmetics appear to be unwarranted.[21]

When estrogens in suitable vehicles are applied to the surface of animal skins, the majority of reports indicate that there are some local effects on the skin [22] as well as possible effects on distant organs.[23] The response of human skin, however, may not necessarily be similar to that of animal skin when estrogens are applied, for evidence that cutaneous effects occur in humans is not as conclusive. Most investigators who feel that they see histological changes in the skin of aging women agree that there is very little evidence of alteration of the skin of men or young women.[24]

Much of the evidence in support of the alteration of aging skin by the local application of estrogens is histological.[25] The changes that have been observed—thickening of the epidermis, extension of the papillae, increase in the amounts of elastic tissue and in the diameter of the collagen bundles—are difficult to quantitate. Some of the changes may be due to the angle at which the histological section has been cut. Much of this work seems to lack objectivity. Seldom have the investigators used control sites of skin treated with the vehicle alone, and seldom have they made their observations on coded slides. Goldzieher, Roberts, Rawls, and Goldzieher [25a] did observe coded slides.

Clinical evidence to support or contradict the opinion that estrogen creams delay or reverse the aging process in the skin is meager. Any change is likely to be quite subtle and to develop slowly; thus, adequate controls are very important. In one recent well-controlled study [26] 27 women of various ages applied an estrogen cream to one side of the face and vehicle to the other side for a period of 91 days; no difference could be detected in the two sides of the face. A decision as to whether the subjects of this clinical evaluation represent the type of individuals for whom estrogen creams might be effective and whether the conclusions are justifiable must await further observations of this kind.

One should not dogmatically say at this time that the external application of estrogen creams does nothing to aging skin, but good clinical evidence to support a statement to the contrary is not yet available. In 1948, Sevringhaus [27] said:

> The whole field of percutaneous administration of estrogens has had very little systematic study by qualified investigators. Systemic as well as local effects are involved. A recent review of the local activity of the sex hormones presents but little helpful information on this part of the problem, but points out the unfortunate exploitation of the public by the purveyors of certain cosmetics. The remedy for such undesirable methods of treatment lies in careful study of the field by the medical profession.

Eight years later, there is less concern about possible systemic effects, but it is felt that the medical profession has not adequately responded to this challenge, and it has not been proved conclusively that the estrogen creams either do or do not affect the aging skin.

Massachusetts General Hospital (14).

The original title of this report as presented at the Symposium was "The Emollient Creams and Their Modern Additives."

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THE COSMETIC PROBLEM

GUEST EDITORIAL

Arnold J. Lehman, M.D., Ph.D.

During the past several decades, the popularity of cosmetic preparations has increased so considerably that, at present, their general use has become almost a necessity for the average woman. As such, these preparations are leaving the realm of luxury items. This demand has led to the new use of many known substances and the development and extensive manufacture of new synthetic compounds for incorporation into such products. Unfortunately, carefully controlled research by competent investigators, particularly concerning the fundamental principles of skin properties and mechanisms and the related problems in skin pharmacology and toxicology, has not kept pace with the many new products and the claims made in their behalf.

Certain unobjectionable claims have been advanced for the efficacy of certain cosmetic preparations for mitigating skin dryness, hiding skin blemishes and wrinkles, and affording a continued healthy and youthful appearance to the skin. In recent years, however, the trend has been to advertise such products as being more than just cosmetics. Preparations that at one time or another have been misrepresented include hair growers or hair restorers, hair color restorers, dandruff removers, deodorants, lipsticks, cold creams and cleansing creams, and freckle removers. The claims proposed for these products include suggestions that they serve as skin foods, skin rejuvenators, nourishing creams, skin tonics, contour creams for bust development or bust reducing, wrinkle eradicators, and deep pore cleansers. To date, however, no conclusive evidence has been offered in support of many of these claims. For example, there is nothing known to science that will restore color to hair or cure early male baldness.

In accord with this recent advertising trend, a number of biologically active substances such as vitamins and hormones have been incorporated into cosmetic preparations. The claims for these preparations subtly hint at their therapeutic efficacy without actually stating so. Vitamin A supposedly enhances the appearance of the skin. Actually, however, the scientific literature contains no well-substantiated account to support the contention that cosmetics containing vitamin A are of greater value than those that lack it. Similarly, the incorporation of potent ingredients such as the estrogens is without adequate scientific justification. It has not been conclusively proved that estrogen-containing cosmetics have any beneficial effect on age changes, wrinkles, or blemishes. Reports have appeared in the literature to suggest that, after topical application of these products, sufficient absorption from the skin might occur to upset body activity. However, more evidence is needed on this point. The problem does not concern only the safety and efficacy of vitamins and hormones; it extends to the potential harm that indeed may follow the indiscriminate inclusion of other similarly potent chemicals in cosmetic products.

The need for increasing the scope and number of investigations relating to fundamental problems of skin physiology, biochemistry, pharmacology, and toxicology cannot be stressed too strongly. The report by Dr. Blank in this issue of THE JOURNAL (page 412) serves as an illustration of the types of basic study needed to help solve the cosmetic problem.

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MEDICAL LICENSURE

The 55th annual report on medical licensure prepared by the Council on Medical Education and Hospitals appears in this issue of THE JOURNAL. Data are presented in the first section concerning the medical examination and the licensure of physicians in the United States and its territories and outlying possessions for 1956. In addition, the report summarizes trends in licensure over many years. Current regulations pertaining to medical licensure are also presented. The boards of examiners in the basic sciences are discussed in the second section of the report and, lastly, the National Board of Medical Examiners.

The report calls attention to the development of examination institutes by the Federation of State Medical Boards of the United States. This commendable effort aimed at uniformity, equivalence, and improvement in the quality of the licensing examination should result in a meaningful evaluation for fitness to practice medicine. The first institute held in February was devoted to the examination in obstetrics and gynecology, and a summarization of the program presented indicated "that the licensing examination should be one that would determine the candidate's appreciation of medical problems and his responsibility toward them at a point beyond the final evaluation by the medical school."

In 1956, a total of 14,543 licenses to practice medicine were issued by 54 boards authorized by law to grant licenses to practice the art and science of medicine. The 14,543 licenses issued last year represented 7,122 granted after a successful written examination and 7,421 granted by reciprocity and endorsement of state licenses or the certificate of the National Board of Medical Examiners.

Additions to the medical profession are reflected in a number of tables included in this study. There were 7,463 physicians who secured their first license to practice medicine and surgery during the calendar

year 1956. In the same year, 3,659 deaths of physicians were reported to the offices of the American Medical Association. Thus, the physician population in the United States and its territories and outlying possessions was increased by 3,804.

Failures by graduates of approved medical schools in the United States amounted to 4.5% and by graduates of approved medical schools in Canada 11.5%. The percentages of failure in three other groups—graduates of foreign faculties of medicine, unapproved medical schools, and schools of osteopathy—were 43.2, 81.8, and 26 respectively.

Provision is made by 33 boards for the issuance of temporary and educational permits, limited and temporary licenses, or other certificates of limited registration. The terms for the issuance of these certificates vary and may apply to hospital training, to those ineligible for licensure who seek further educational training, for practice in emergency areas, or for regular practice until the next regular session of the licensing board when permanent licensure is granted. The report further outlines the licensure requirements for interns and residents in hospitals, the states which require an internship for licensure, the preprofessional and professional educational requirements of each licensing board, the schedule of written examination dates and reciprocity meetings, medical license fees, licensure on government credentials, and annual registration requirements.

A progress report pertaining to the Educational Council for Foreign Graduates, which is attempting to develop an evaluation service for foreign medical graduates, is included. The study reveals that graduates of foreign medical schools were examined for medical licensure by 37 boards in 1956. Graduates of 213 medical schools and 5 licensing corporations were examined, representing medical schools in the Philippines, New Zealand, 16 South and Central American countries, 24 countries in Europe, and 13 countries in Asia. More than 50 graduates of the universities of Havana, Munich, Bologna, and Mexico City were tested, and more than 20 graduates of 17 other schools were examined. The number who were successful in these tests was 1,012. Failures numbered 771, or 43.2% of those examined. There was a slight increase in 1956 over the previous year in the numbers examined, while the figure representing those who passed the examination in 1956 decreased as compared with 1955. During 1956 there were 852 foreign-trained physicians licensed who represent additions to the medical profession having secured their first license during the year. Of this group, 834 were licensed after written examination and 18 by endorsement of credentials. In a seven-year period, it was shown that 4,543 foreign-trained physicians were added to the physician population of the United States.

That portion of the report pertaining to the results of examinations given by the 21 boards of examiners in the basic sciences reveals that certificates were issued to 6,107 candidates in 1956. Of these, 3,734 were granted after written examination and 2,373 by reciprocity, endorsement, exemption, or waiver. The failure percentage for those reporting this information was 16.6. The basic science laws do not specify that a candidate reveal his school of practice. No attempt has been made in this study to differentiate between the schools and the healing art represented by the candidates examined or certified.

The last series of tabulations refers to the examinations given by the National Board of Medical Examiners. The certificate of the National Board is recognized by the medical licensing authorities of the states, the District of Columbia, and the territories, with the exception of Arkansas, Florida, Georgia, Indiana, Louisiana, Michigan, North Carolina, and Texas. There were 2,072 physicians who were certified as diplomates last year. The largest number of candidates presenting the same type of credentials for medical licensure by endorsement last year were 3,109 diplomates certified by the National Board of Medical Examiners in 42 states, the District of Columbia, and the territories.

This useful and informative study compiled annually by the Council is made available through the cooperation of the various examining and licensing boards; for their cooperation, the Council and THE JOURNAL wish to express appreciation.

ADVANCES IN LICENSURE

In the past few years there has been an increasing interest in the Federation of State Medical Boards to improve and reevaluate the whole field of licensure. The prime stimulus for this activity has come from two sources—the unanimous decision that a preliminary solution to the foreign-graduate problem had to be found, and the growing interest of the federation to relate itself more closely to the interests of medical education.

The turning point in the foreign-graduate problem was reached when, in 1953, it was conceded that the management of the foreign graduate should be approached from a national level in developing a preliminary program. The federation joined the Council on Medical Education and Hospitals, the Association of American Medical Colleges, and the American Hospital Association to create the Educational Council for Foreign Graduates, Inc. Thus, for the first time, the federation and the other interested groups have determined that educational qualification shall be a prime consideration in dealing with the foreign graduate in the future. Prior to this, there had been some experimentation with additional educational requirements in New York and Michigan which indicated the desirability of overcoming educational deficiencies. The federation will maintain a strong interest in this direction in the future. The state boards are now aware that physicians coming from all over the world present varying levels of educational attainment.

Having made this degree of progress in the foreign-graduate problem, the federation has now turned to some of its more domestic problems. It has become obvious in recent years that licensure had not reconsidered its position in respect to the advances in modern medical education. The teaching institutes of the Association of American Medical Colleges proved to be an excellent pattern for the approach to the reevaluation of the licensing examinations. In 1956, the federation ratified a resolution to establish examination institutes designed to improve the local, as well as the national, level of state board examinations. It is also

expected that the completion of the institutes will result in far wider acceptance of interstate endorsement of medical licenses.

A novel approach to the improvement of licensing examinations is the separation of educational and fitness testing. While this is a somewhat belated recognition of accredited medical education, it serves the purpose of creating a wider interest in medical education as well as a more accurate definition of what the licensing examination should be. In the first institute, determination of the candidate's understanding and appreciation of medical problems at a point beyond graduation from medical school was defined as an objective.

The federation has an expanding interest in all phases of the education of a physician. One paper on the 1956 program was on some aspects of preprofessional education. Recently the attendance of federation members at educational meetings has increased yearly. A number attended the first World Conference on Medical Education in London in 1953.

In looking ahead, licensure will interest itself in improved leadership, periodic evaluation of its position, more uniform thinking on the problems of discipline and narcotic addiction in physicians, improvement of public relations, closer relations with Canadian licensing authorities, and a better understanding of basic concerns. Through the *Federation Bulletin,* more information on the state of medical education in other countries will be provided.

Licensure has abandoned the static state, and it is dedicated to its responsibility in the dynamic progress of the medical profession.

CONVENTION DRUG SAMPLES

During recent medical conventions several unfortunate incidents occurred involving the distribution of drug samples. In one case, a boy about 10 years of age was found wandering alone through the technical exhibit, his pockets filled with almost two dozen bottles and envelopes of multicolored pills. What attracted attention to the lad was his eating one pill after the other. On questioning, he expressed his enjoyment of the candy coatings. Included in his cache was over 14 Gm. (200 grains) of barbiturates. In another such occurrence that eventually could have proved dangerous, a guard stopped a man leaving the exhibit floor, who had evidently just removed his identification badge. When asked to show his credentials, the man ran away, leaving two shopping bags filled with more than 200 samples of various drugs.

A third illustration points out still another cause for alarm. At the close of a moderate-sized medical convention a few years ago, a survey was made of the three major hotels that housed the visiting doctors. How much of various products had been distributed during the course of the technical exhibit was known, and it was found that over 80% of the samples collected had been discarded in the wastebaskets of the hotel rooms.

The problem of how to give the doctor samples of pharmaceutical products in such a manner as will not endanger the public health seems to occur at every medical meeting. New attention has been focused by the Food and Drug Administration on this form of physician's sample distribution. While recognizing the common practice of distributing drug samples at medical meetings, Deputy Commissioner John L. Harvey recently reminded pharmaceutical manufacturers of their legal responsibility to insure that prescription drugs be available only to legally authorized persons.

Many physicians and the ethical drug companies are in agreement that letting the doctor see, feel, and then actually test a sample of a product, either on himself or on the proper patient, will supply the most convincing evidence of its efficacy. In addition, both groups are agreed that comprehensive pharmacological data on the drug should accompany the sample. When the physician receives a product by direct mail, it is usually accompanied by package literature. If the detail man delivers the sample, he not only can supply the package literature and reports of research studies but he can answer, or at least obtain answers, to the doctor's queries. In the convention hall, however, while there are usually representatives of the pharmaceutical houses available to provide information along with the sample, it is not unusual to find the samples piled up on the display counter, where they are easily accessible to nonmedical persons. It is this form of dispensing that is potentially hazardous.

There is another method of supplying professional samples to the practicing physician who attends a medical convention, one that has been increasingly adopted over the past few years. This is the use of the registration card that is completed by the doctor when he observes a company's exhibit. It seems, however, that many physicians are hesitant to fill out such a card because of the fear of being deluged by dozens of detail men immediately after the convention. It would appear, on the surface, that a simple solution to allay such apprehension would be to have the registration card include the statement, "Do you wish our professional representative to make a special visit? Yes___No___." On this same card could be a listing of available samples, allowing the doctor to designate his interests. While this method will also relieve the doctor of having to carry various packages from meeting to meeting, at the same time it puts an additional responsibility on the pharmaceutical houses to mail the requested product to the doctor's office within a reasonably short period of time.

There is no doubt that most pharmaceutical manufacturers are concerned over the problem of samples of potent drugs falling into the wrong hands. The Medical Exhibitors Association and the manufacturers have discussed repeatedly what can be done to keep the practice under control. For a convention of the size of the annual American Medical Association meeting, the problem assumes important practical significance.

In consequence of this, an official placard carrying the Medical Exhibitors Association insignia that announces the "no sampling" procedure will be supplied to and may be used by any of the pharmaceutical companies who will be present as exhibitors at the forthcoming Annual Meeting of the A. M. A. in New York City. This sign will read:

WELCOME DOCTOR

For your convenience, samples and literature will be delivered to your home or office as you request.

MEDICAL LICENSURE STATISTICS FOR 1956

FIFTY-FIFTH ANNUAL PRESENTATION OF LICENSURE STATISTICS BY THE COUNCIL ON MEDICAL EDUCATION AND HOSPITALS OF THE AMERICAN MEDICAL ASSOCIATION

The data in the following annual report on Medical Licensure Statistics have been compiled by the staff under the supervision of Mrs. Anne Tipner, Assistant to the Secretary of the Council on Medical Education and Hospitals. The Council desires to express appreciation to the officers of the examining boards and licensing agencies who have cooperated in furnishing the official information essential in the preparation of this report.

Edward L. Turner, M.D., Secretary
Council on Medical Education and Hospitals

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INTRODUCTION

Statistical compilations regarding medical licensure are presented annually in the State Board Number of THE JOURNAL. The report for 1956 constitutes the 55th annual presentation. Data are included pertaining to (*a*) medical examining and licensing boards of the United States, the District of Columbia, and the territories and outlying possessions of the United States, (*b*) the boards of examiners in the basic sciences, and (*c*) the National Board of Medical Examiners.

The computations presented are based on official records received throughout the year from all medical examining and licensing agencies of all states, Alaska, Hawaii, Guam, Puerto Rico, Virgin Islands, and the Canal Zone. The figures for Connecticut also include data reported by the homeopathic medical examining board of that state. The homeopathic boards in Louisiana and Maryland had no new licentiates last year. By recent legislative action in Maryland, the homeopathic board, after investigation regarding the issuance of spurious licenses, was abolished. All licenses issued by this board were canceled. Data are also included pertaining to the 21 boards of examiners in the basic sciences and, lastly, the National Board of Medical Examiners. The Council and THE JOURNAL gratefully acknowledge their appreciation to those who have supplied these data as well as other records furnished throughout the year to the American Medical Association.

In the descriptive data reference is made to the total number of boards for which figures are reported. The figures include the examining and licensing boards in the territories and outlying possessions and also the homeopathic board of Connecticut.

EXAMINATION INSTITUTES

After several years of concentration on the foreign graduate problem, the Federation of State Medical Boards of the United States turned its attention in 1956 to the concept of reevaluating the licensing examinations. Following the idea of the teaching institutes of the Association of American Medical Colleges, the federation appointed a permanent committee to develop a program of institutes to review the major areas of medicine involved in examinations given by state boards.

The permanent committee recommended certain objectives which are aimed at uniformity, equivalence, and improvement in quality in the licensing examination. One of the essential decisions involved the separation of educational and fitness testing and a clear understanding of what each of these divisions involves. The effort will be made in the institutes to direct the licensing examination away from textbook questions and toward problem situations in the exercise of responsibility.

The basic pattern of the individual institute will follow a program of analysis in a particular area covered by a licensing examination. The first institute was in obstetrics and gynecology, given during the 1957 Annual Congress on Medical Education and Licensure. Perhaps the basic question for each institute is, "What should be the type of examination best suited to this particular subject?" In the Obstetrics and Gynecology Institute, one of the significant conclusions reached was that the licensing examination should be one that would determine the candidate's appreciation of medical problems and his responsibility toward them at a point beyond the final evaluation of the medical

school. This conclusion clearly divides educational and fitness testing by the introduction of the factor of responsibility as something of unusual value in the measurement of fitness.

The institute idea takes for granted that the candidate's medical education has been satisfactory, and at the same time it recognizes that the student is restricted in using responsibility. Thus, the objective of fitness testing is moved ahead to a point where there has been a more liberal exposure to responsibility and follow through in the definitive care of patients. At the same time, examiners are cautioned not to pitch their questions at the level of advanced specialty training, since this is more properly the area for specialty board examinations.

The examination institutes seem destined to improve the individual examiner by providing a better understanding of his responsibility. It is also evident that the licensing examination will be improved in the general area of continuation education. Publication of the final reports of each institute will serve as a reliable guide to future examiners appointed to boards.

The motivation to reevaluate the licensing examination stems from the desire to have licensure assume a realistic role in modern medical education.

MEDICAL LICENSURE STATISTICS

The tables referring to medical licensure present figures pertaining to the number of candidates examined, the number licensed, and the number who represent additions to the physician population. Data are also included pertaining to the regulations for medical licensure both of physicians who secured their professional training in the United States and Canada, and of physicians educated in other countries. The state boards are discussed first, followed by the basic science boards and the National Board of Medical Examiners.

STATE BOARDS OF MEDICAL EXAMINERS

Licenses Issued

In 1956, 14,543 licenses to practice medicine were issued by 54 boards authorized by law to grant licenses to practice the art and science of medicine. The number licensed by each of these boards by examination or by endorsement of credentials is shown in table 1. Of the 14,543 licenses issues, 7,122 were granted after written examination and 7,421 by reciprocity and endorsement of state licenses or the certificate of the National Board of Medical Examiners.

Physicians certified in a given year after written examination were not in all instances tested in that year. The licensing boards of 27 states, the District of Columbia, Alaska, Canal Zone, Hawaii, Puerto Rico, and the Virgin Islands require a year of internship for licensure. The candidate for medical licensure in some of these states is permitted to write the examination before or while serving an internship and, if he is successful, the license is issued on completion of the internship. Licenses are withheld in some states for other technicalities. In general, also, the licenses of physicians examined in December are dated and issued in the early part of the following year. Table 1, therefore, includes some data on physicians who were examined in 1955 and on a few who were examined in previous years. The figures presented in this table will not correspond with succeeding tables that deal entirely with physicians examined for licensure within the year 1956. In tables 11, 12, and 13 can be noted the number of physicians who secured their first license in 1956 and who thus represent additions to the medical profession in the United States and its territories and outlying possessions.

TABLE 1.—*Licenses Issued, 1956*

	Examination	On the Basis of Reciprocity and Endorsement	Total
Alabama	90	67	157
Arizona	18	87	105
Arkansas	67	31	98
California	490	1,255	1,745
Colorado	104	112	216
Connecticut	37	297	334
Delaware	12	9	21
District of Columbia	10	146	156
Florida	544	0	544
Georgia	203	101	304
Idaho	3	41	44
Illinois	324	228	552
Indiana	181	135	316
Iowa	82	48	130
Kansas	122	65	187
Kentucky	97	136	233
Louisiana	242	95	337
Maine	42	45	87
Maryland	294	198	492
Massachusetts	33	349	382
Michigan	299	234	533
Minnesota	211	150	361
Mississippi	101	47	148
Missouri	242	133	375
Montana	5	36	41
Nebraska	118	34	152
Nevada	2	23	25
New Hampshire	13	47	60
New Jersey	81	384	465
New Mexico	3	48	51
New York State	336	1,019	1,355
North Carolina	209	81	290
North Dakota	28	18	46
Ohio	541	332	873
Oklahoma	91	50	141
Oregon	42	84	126
Pennsylvania	535	186	721
Rhode Island	44	29	73
South Carolina	95	42	137
South Dakota	9	9	18
Tennessee	179	90	269
Texas	366	212	578
Utah	28	45	73
Vermont	16	24	40
Virginia	234	122	356
Washington	63	226	289
West Virginia	26	84	110
Wisconsin	140	121	261
Wyoming	7	20	27
Alaska	0	8	8
Canal Zone	0	3	3
Hawaii	17	17	34
Guam	0	4	4
Puerto Rico	46	14	60
Virgin Islands	0	0	0
Totals	7,122	7,421	14,543

Of the 14,543 licenses to practice medicine and surgery issued in 1956, both by examination and by reciprocity and endorsement of credentials, the greatest number (1,745) were issued in California. New York licensed 1,355, while more than 500 each were registered in Florida, Illinois, Michigan, Ohio, Pennsylvania, and Texas. Delaware, Idaho, Montana, Nevada, North Dakota, South Dakota, Vermont, and Wyoming issued less than 50 each. The fewest (18) were li-

censed in South Dakota. Among the territories and possessions, Puerto Rico licensed 60, Hawaii 34, Alaska 8, Guam 4, and the Canal Zone 3. None were licensed for private practice in the Virgin Islands. There was a decrease of 297 in the total number of licenses issued in 1956 as compared with the previous year. The decrease in the number licensed after written examination was 257 and by endorsement or reciprocity the decrease totaled 40.

Totals of the physicians licensed for 21 previous years, and for 1956, by both examination and reciprocity or endorsement, are included in table 3. Beginning in 1936 there was a marked increase in the number of physicians licensed representing principally the licensure of foreign-trained physicians. The increases in 1946 and succeeding years were the result of the increase in the production of physicians by the medical schools of the United States and Canada, the licensure of foreign-trained physicians, and in the reciprocity and endorsement group the movement of physicians to other locations for practice. In the 22-year period from 1935 to 1956, 252,156 medical licenses have been issued, 138,658 after written examination and 113,498 by endorsement of credentials.

Candidates Examined

In table 2 are recorded data referring to applicants for medical licensure by 51 licensing boards.[1] For each board is given the number who passed and failed, the medical school of graduation, the percentage of failures for each school as well as each licensing board, and the number of states in which graduates of a given school were examined. Approved medical schools in the United States that are no longer in existence, foreign faculties of medicine, unapproved medical schools, and schools of osteopathy are not listed by name, but the numbers examined in these three categories are included after those for existing medical schools in the United States and Canada.

Throughout the last calendar year 8,342 candidates were examined, of whom 7,179 passed and 1,163 failed. The candidates represented graduates of 76 existing approved medical schools of the United States, 11 approved medical schools of Canada, 2 approved medical schools in the United States no longer in operation, 218 faculties of medicine or licensing corporations of other countries, 5 unapproved medical schools in the United States that are no longer in operation, and 8 schools of osteopathy. Osteopaths who were granted the legal right to practice medicine, surgery, or both by the medical examining boards are included in these statistics. Osteopaths in other states who were granted the privilege of special practice by other than medical examining boards are excluded from these compilations.

Examination and reciprocity meetings are scheduled at frequent intervals by licensing boards in most of the states to facilitate licensure and to enable physicians to commence practice without undue delay. Later in this study a tabulation is included giving the schedules for all states. The publication of the dates for examinations and reciprocity or endorsement meetings is a regular biweekly feature of THE JOURNAL.

Represented among the 8,342 examinees were 6,149 graduates of approved medical schools in the United States, of whom 4.5% failed; 165 graduates of approved schools in Canada, with 11.5% failures; 9 who graduated from approved medical schools no longer in operation, all of whom failed; 1,783 graduates of faculties of medicine located in countries other than the United States and Canada, 43.2% of whom failed; 44 graduates of unapproved medical schools at one time in existence in the United States, with 81.8% failures; and 192 graduates of schools of osteopathy, with 26% failures.

As in table 1, the 8,342 examinees do not represent an equal number of persons, since a candidate tested in more than one state in a calendar year is counted in each state. If a candidate failed more than once in a given state within the year, however, he is counted in that state as an individual or a single failure. Figures that show the number of individual licentiates added to the medical profession in 1956 are given in tables 11, 12, and 13.

The University of Tennessee, a state university, had the greatest number of graduates for any one school examined for medical licensure in 1956. There were 231 graduates examined, of whom 136 were tested in Tennessee and 95 in 11 other states. The greatest number examined from a private school was 175, representing Tulane University School of Medicine; they were tested in 13 states, with 104 being examined in Louisiana, where the school is located. Twenty-seven schools each had more than 100 of their graduates examined for medical licensure in 1956 as follows:

State and Municipal Schools	No. of Examinees	No. of States in Which Examinations Were Taken
University of Tennessee	131	12
University of Michigan	194	13
University of Illinois	167	14
Ohio State University	164	7
University of Texas	163	7
Indiana University	161	9
University of Minnesota	129	8
Medical College of Virginia	120	9
State University of Iowa	119	8
University of Kansas	118	4
University of Maryland	118	7
Southwestern Medical School	107	5
Louisiana State University	104	3
University of Cincinnati	104	9
University of Oklahoma	101	5
Private Medical Schools		
Tulane University	175	13
Jefferson Medical College	174	16
St. Louis University	138	11
Duke University	128	12
Northwestern University	117	23
Emory University	114	5
Washington University	113	7
University of Pennsylvania	109	16
Temple University	108	13
University of Louisville	107	4
University of Pittsburgh	104	10
Hahnemann Medical College	101	12

The State University of New York at Syracuse, with nine examinees, had the fewest number of applicants for medical licensure by written examination before state boards. The majority of the graduates of this

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
SCHOOL	Alabama	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Dist. of Columbia	Florida	Georgia	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota
	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F
ALABAMA																						
1 Medical College of Alabama, Birmingham	72 0								10 1	2 0												
ARKANSAS																						
2 University of Arkansas School of Med., Little Rock			64 1						7 0										1 0			
CALIFORNIA																						
3 Coll. of Med. Evangelists, Loma Linda-Los Angeles				66 0	2 0				5 1	2 0									4 0		2 0	
4 Univ. of So. California School of Med., Los Angeles				66 0																		
5 Stanford University School of Med., San Francisco				54 0					1			2 0										
6 Univ. of California School of Med., San Francisco		1 0		77 0																1 0		
7 Univ. of California School of Med., Los Angeles				31 0																		
COLORADO																						
8 University of Colorado School of Medicine, Denver		2 0			68 1		1 0					2 0								1 0		
CONNECTICUT																						
9 Yale University School of Medicine, New Haven									2 1												1 0	
DISTRICT OF COLUMBIA																						
10 Georgetown University School of Medicine					1 0			8 0	6 1				1 0									
George Washington University School of Medicine				1 0			1 0	1 0	15 1	1 0									1 0		1	
11 Howard University College of Medicine						0 1		1 1	1 0			2 3	1 0						29 1		1	
FLORIDA																						
12 University of Miami School of Med., Coral Gables						0			24 0	2 0												
GEORGIA																						
Emory University School of Medicine, Atlanta									39 4	65 0												
13 Medical College of Georgia, Augusta									9 7	67 0												
ILLINOIS																						
Chicago Medical School				4 1					10 1			1 0	4 0									
Northwestern University Medical School, Chicago	2 0				6 0				10 1			34 5	8 0	1 0	2 0	1 0	3 0				7 0	6
Stritch School of Med. of Loyola Univ., Chicago				2 0		3			3 1			37 2	2 0						1 0	1 0	2 0	6
University of Chicago, The School of Medicine	1 0	1 0		5 0	2 0	2	1 0		4 2			12 1					1 0		1 0	3 0		2
14 University of Illinois College of Medicine, Chicago				18 1					10 5			108 3	2 0	1 0	1 0					2 0	1 0	4
INDIANA																						
Indiana University School of Med., Bloomington-Indianapolis									8 1			1	1 139	4		1 0						1
IOWA																						
15 State Univ. of Iowa College of Medicine, Iowa City									5 2				1 0	164 1			1 0					2
KANSAS																						
16 University of Kansas School of Medicine, Lawrence-Kansas City					1 0				3 1						112 0							1
KENTUCKY																						
17 University of Louisville School of Med., Louisville									14 4			1 1				86 0						
LOUISIANA																						
Louisiana State Univ. School of Med., New Orleans									6 2								92 0					
18 Tulane University School of Medicine, New Orleans	1 0								27 13	1 0		2 0					104 0		1 0			1
MARYLAND																						
Johns Hopkins Univ. School of Med., Baltimore				2 0					8 3	1 0								1 0	63 0		1 0	
19 University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore				1 0					10 6										93 1			
MASSACHUSETTS																						
Boston University School of Medicine									7 3												1 0	1
Harvard Medical School, Boston	1 0			4 0								1 1	1 0				1 0		1 0	3 0	1 0	2
20 Tufts University School of Medicine, Boston							1 0		7 3	1 0							5 0					1
MICHIGAN																						
University of Michigan Medical School, Ann Arbor				1 0	1 0				6 2			1 0		1 0			2 0			1	172 0	
21 Wayne State University College of Med., Detroit				1 1					4 2												1 65 0	
MINNESOTA																						
22 University of Minnesota Med. School, Minneapolis				1 0		1 0			3 1			1 5										118 1
MISSOURI																						
St. Louis University School of Medicine							1 0		4 2			3 0					2 0					3 0
23 Washington University School of Med., St. Louis					1 0				6 4													2 0
NEBRASKA																						
Creighton University School of Medicine, Omaha		2 0		6 1	1 0								1		6 1	1 0		1 0			5 0	3 0
24 University of Nebraska College of Medicine, Omaha		2 0			1 0				4 2			2 0		2 0	1 0							1 0
NEW YORK																						
Albany Medical College									7			1 0					1 0					
25 University of Buffalo School of Medicine		1 0							7 3				1 0				2 0					
Columbia University College of Physicians and Surgeons, New York	1 0			1 0		1 0			8			2 0										
26 Cornell University Medical College, New York					1 0			1 0	10 2				1 0	1 0					2 0		1 0	
New York Medical College, Flower and Fifth Avenue Hospitals			1 0	1 1		1 0			11 5				2 0				3 0			1 0		

	Totals	Examined—Passed	Examined—Failed	% Failed	No. of Boards Examined by	Marginal Number
Missouri	87	85	2	2.3	5	1
Montana	71	70	1	1.4	7	2
Nebraska	88	86	2	2.3	12	3
Nevada	67	67	0	0.0	2	4
New Hampshire	57	56	1	1.8	3	5
New Jersey	81	81	0	0.0	4	6
New Mexico	31	31	0	0.0	1	7
New York	76	75	1	1.3	6	8
North Carolina	13	11	2	15.4	6	9
North Dakota	34	33	1	2.9	9	10
Ohio	28	27	1	3.6	11	11
Oklahoma	64	51	13	20.0	14	12
Oregon	26	26	0	0.0	2	13
Pennsylvania	114	110	4	3.5	5	14
Rhode Island	83	76	7	8.4	2	15
South Carolina	26	24	2	7.7	8	16
South Dakota	117	108	9	7.7	23	17
Tennessee	77	73	4	5.2	13	18
Texas	46	42	4	8.7	16	19
Utah	167	158	9	5.4	14	20
Vermont	161	154	7	4.3	9	21
Virginia	119	116	3	2.5	8	22
Washington	118	117	1	0.8	4	23
West Virginia	107	102	5	4.7	4	24
Wisconsin	104	102	2	1.9	3	25
Wyoming	175	162	13	7.4	13	26
Hawaii and Puerto Rico	87	82	5	5.7	11	27
	118	111	7	5.9	7	28
	18	14	4	22.2	6	29
	42	41	1	2.4	17	30
	21	18	3	14.3	8	31
	194	191	3	1.5	13	32
	75	71	4	5.3	5	33
	129	127	2	1.6	8	34
	138	132	6	4.3	11	35
	113	109	4	3.5	7	36
	78	75	3	3.8	18	37
	95	92	3	3.2	9	38
	11	11	0	0.0	5	39
	15	12	3	20.0	5	40
	32	31	1	3.1	13	41
	37	35	2	5.4	15	42
	52	43	9	17.3	12	43

SCHOOL	1 Alabama		2 Arizona		3 Arkansas		4 California		5 Colorado		6 Connecticut		7 Delaware		8 Dist. of Columbia		9 Florida		10 Georgia		11 Idaho		12 Illinois		13 Indiana		14 Iowa		15 Kansas		16 Kentucky		17 Louisiana		18 Maine		19 Maryland		20 Massachusetts		21 Michigan		22 Minnesota	
	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F
NEW YORK—continued																																											
New York University College of Medicine																	5	6															4	0					1	0		
State University of New York College of Medicine, New York City							1	0	3	0	1	0					3	0					1	0									1	0					1	0		
Univ. of Rochester School of Med. and Dentistry					1	0			1	0					1	0	10	0																	1	0	1	0				
State Univ. of New York College of Med., Syracuse																	2	0																					1	0		
NORTH CAROLINA																																											
Univ. of No. Carolina School of Med., Chapel Hill																	1																										
Duke University School of Medicine, Durham	1	0					2	0	1	0					1	0	26	5	2	0			1	2	0				1	0												
Bowman Gray School of Medicine of Wake Forest College, Winston-Salem																	7	2																								
OHIO																																										
University of Cincinnati College of Medicine																	2	4					2	1																		
Western Reserve Univ. School of Med., Cleveland																	4	1					1	0																		
Ohio State University College of Med., Columbus									1	0							10	4					1	0																		
OKLAHOMA																																										
Univ. of Oklahoma School of Med., Oklahoma City																	3	2	1	0					1	0							3	0								
OREGON																																											
University of Oregon Medical School, Portland			1	0			14	1															1	0	1	0	1	0					2	0			2	0			2	0
PENNSYLVANIA																																										
Hahnemann Med. Coll. and Hosp. of Philadelphia							1		1	0							17	7																	1	0	1	0				
Jefferson Medical College of Philadelphia	1	0					2	0			1	0			1	0	17	3	1	0	2	0			2	0							1	0					1	0		
Temple University School of Medicine, Philadelphia	1	0					2	0	1	0							12	4	1	0					1																	
Univ. of Pennsylvania School of Med., Philadelphia							3	0			1	0					8	1					1	0	1	0							1	0	2	0	2	0			2	0
Woman's Med. Coll. of Pennsylvania, Philadelphia							1	0									2	0	1	0			1	0									1	0					1	0		
University of Pittsburgh School of Medicine							1	0									7	1	1	0																						
SOUTH CAROLINA																																										
Medical College of South Carolina, Charleston																	3	0																								
TENNESSEE																																										
Univ. of Tennessee College of Medicine, Memphis	4	0															22	10	1	0													1	0			1	0				
Meharry Medical College, Nashville	1	0	1	0			1	1									2	1	47	0					1				2	0					2	0						
Vanderbilt Univ. School of Medicine, Nashville																	6	2					1	0																		
TEXAS																																										
Univ. of Texas Southwestern Med. School, Dallas																	2	0															1	0								
University of Texas Medical Branch, Galveston			2	0																			2	0					1	0	1	0					1	0	1	0		
Baylor University College of Medicine, Houston			2	0													3	0																								
UTAH																																										
University of Utah School of Med., Salt Lake City							12	0													1	0	2	0			1	0			1	0					2	0				
VERMONT																																										
University of Vermont College of Med., Burlington							1	0									5	0																							1	0		
VIRGINIA																																										
Univ. of Virginia School of Med., Charlottesville							1	0									6	1															1	0								
Medical College of Virginia, Richmond															1	0	8	1															1	0								
WASHINGTON																																										
University of Washington School of Med., Seattle	1	0					3	0															1	0	2	0			1	0	1	0			2	0						
WISCONSIN																																										
University of Wisconsin Medical School, Madison			1	0			3	0									1	0					1	0									4	0					4	0		
Marquette University School of Med., Milwaukee							6	0	1	0					1	0	4	4					4	0	2	0							1	0			1	0	4	0		
PUERTO RICO																																											
Univ. of Puerto Rico School of Med., San Juan																			1	0																								
CANADA																																										
Univ. of Alberta Faculty of Medicine, Edmonton							2	0			1						1	0																								
Univ. of British Columbia Fac. of Med., Vancouver																																											
Univ. of Manitoba Faculty of Medicine, Winnipeg							5	0															1	1	0														1	0		
Dalhousie University Faculty of Medicine, Halifax	1	0					1	0			1												1	0											2	0			1	0		
University of Ottawa Faculty of Medicine					1		0		1	0																									2	0			4	0		
Queen's University Faculty of Medicine, Kingston							1	0									1	1																			3	0	3	0		
Univ. of Western Ontario Faculty of Med., London																	1	1												1	0				1	0	3	0				
University of Toronto Faculty of Medicine							5	0									2	0					1	0													2	0	1	0		
McGill University Faculty of Medicine, Montreal							5	2			1	0	1	0			2	0							1	0	1	0					1	0	1	0	2	0	2	0	1	
University of Montreal Faculty of Medicine							1	0			1												1	0											3	0			1	0		
Laval University Faculty of Medicine, Quebec							2	2			1	0																							3	1	1	0				
OTHERS																																										
Foreign medical faculties	1	0	2	1			129	48			25	23	3	1	2	0	14	19	5	0			79	182	3	3	12	6	5	0					25	18	71	35	16	11	23	0	16	
Extinct medical schools																	1																						8				11
Unapproved medical schools																	4	9																					20				
Schools of osteopathy									1	0			3	0									10	1	2	0													3				
Totals	88	19	68	607	95	67	13	19	723	203	3	529	188	139	122	95	242	61	327	78	319	21																				
Totals Examined Passed	88	18	67	548	94	40	12	18	544	203	3	324	181	131	122	95	242	42	290	33	319	21																				
Totals Examined Failed	0	1	1	59	1	27	1	1	179	0	0	205	7	8	0	0	0	19	37	45	0	0																				
Percentage failed	0.0	5.3	1.5	9.8	1.1	40.3	7.7	5.3	24.7	0.0	0.0	38.7	3.7	5.8	0.0	0.0	0.0	31.1	11.3	57.7	0.0	0																				
	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21			

P—Passed; F—Failed

	Missouri	Montana	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Hawaii and Puerto Rico	Totals	Examined—Passed	Examined—Failed	% Failed	No. of Boards Examined by	Marginal Number
	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50						
	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F						
								7 4						2 0					1 0						1 0			31	21	10	32.3	7	44
						2 0		4 1	1 0					3 0														27	26	1	3.7	11	45
	1 0							3 1		1 0	1 0			2 0					2 0						1 0			23	22	1	4.4	14	46
						1 0			1 1					1 0					2 0									9	8	1	11.1	6	47
									57 3																			61	57	4	6.6	2	48
	1 0								79 4													2 0						128	118	10	7.8	12	49
									46 0					1 0														56	54	2	3.6	3	50
	1 0							5 2			83 0								1 0					1 0	1 0		1 0	104	97	7	6.7	9	51
								1 2			72 1																	80	78	2	2.5	4	52
								1 0			143 0			3 0											1 0			164	160	4	2.4	7	53
												91 0																101	99	2	2.0	5	54
								1 0			1 0	30 1		1 0									2 0			1 0		67	65	2	3.0	15	55
				1 0		1 0		3 0			1 0	1 0	64 0						2 0									101	94	7	6.9	12	56
				11 1				3 0			4 0		115 0	1 0														174	170	4	2.3	16	57
				5 0				1 1				1 0	74 0			2 0			1 0				1 0					108	103	5	4.6	13	58
	1 0										1 0		15 0										2 0					109	108	1	0.9	16	59
				4 0				2 0	3 0				15 0										1 0		3 0			28	28	0	0.0	11	60
	1							1 0		1 0	2 0		87 0				1 0		1									104	101	3	2.9	10	61
																62 0												65	65	0	0.0	2	62
	1 0								2 0					2 0				136 0				1 0				1 0		231	221	10	4.3	12	63
	5 1					1 0		2 5	1 1		1 0					2 0		3 0										83	73	10	12.0	16	64
	2 0																	37 0										50	48	2	4.0	5	65
								2 2											95 1								1 0	107	104	3	2.8	5	66
																			148 7									163	156	7	4.3	7	67
																			67 1									77	76	1	1.3	4	68
							1 0	1 0			1 0								15 2				2 0			6 0		50	48	2	4.0	13	69
								1 0						2 0	1 0							3 0					1 1	16	15	1	6.3	8	70
									1														62 3					76	71	5	6.6	6	71
								1 1						1 0									80 8	14 0	3 0		1 0	120	110	10	8.3	9	72
			1 0								1 0		1 0						1 0				31 0		1 0		2 0	50	50	0	0.0	15	73
								1 0						3 0	1 0						1 0			1 0	61 0			84	84	0	0.0	13	74
					1 0 1 0			1 1			2 0			3 0					1 1				2 0		50 0			97	91	6	6.2	17	75
								2						2 0											1 0		7 0	13	11	2	15.4	5	76
	1 0												1 0															8	7	1	87.5	6	77
																												0	0	0	0.0	0	78
									11 0				1 0						1 0						1 0			28	27	1	3.6	9	79
																												8	7	1	12.5	7	80
					1 0 1 0			3 1			1 0			1 0														17	16	1	5.9	10	81
																						1 0						11	10	1	9.1	6	82
										1									1 0									8	7	1	12.5	5	83
	1							2 2			2 0								1 0			2 0						23	20	3	13.0	0	84
	1 0							2 1		1 0				2 0					2 0				3 0					33	30	3	9.1	18	85
										1				2 0							1 0							72	10	2	10.7	9	86
					2 1			1 1		1 0				1 0														17	12	5	29.4	8	87
	11 9		1 1		6 3	41 11		2	193 274		2 7	2	117 49						10 0	39 8		1 0	2 0	17 11			84 31	7 0	8 0	2 0	35 21	1,783	1,012	771	43.3	36	88
																												9	0	9	100.0	2	89
								5	6																			44	9	35	81.8	3	90
					1 6	2		42	33		63 7								9 3						6 0			192	142	50	26.0	11	91
	256	6	120	2	18	95	5	693	221	30	577	91	44	535	52	65	9	179	393	19	4	276	63	26	154	7	84	8,342					92
	244	5	118	2	13	81	3	335	209	28	519	91	42	535	44	65	9	179	365	16	4	234	63	26	154	7	62		7,179				93
	12	1	2	0	5	14	2	358	12	2	58	0	2	0	8	0	0	0	28	3	0	42	0	0	0	0	22			1,163			94
	4.6	16.7	1.7	0.0	27.8	14.7	40.0	51.6	5.4	6.7	10.0	0.0	4.5	0.0	15.4	0.0	0.0	0.0	7.1	15.8	0.0	15.2	0.0	0.0	0.0	0.0	26.2				13.9		95
	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50						

school are licensed by endorsement of the certificate of the National Board of Medical Examiners. This is also true of other schools with small numbers of examinees.

There were 165 graduates of 11 approved medical schools in Canada tested for medical licensure in 1956 by 29 boards. The figures are given for each licensing board by school in table 2 and numbers examined by each board in table 4. Of the 165 candidates examined, 146 passed and 19, or 11.5%, failed.

Nine graduates of two approved medical schools no longer in operation were tested in two states, and none were successful. Graduates of five unapproved medical schools were examined in three states and graduates of eight schools of osteopathy in 11 states. Unapproved schools were represented by 44 graduates, of whom 9 passed and 35, or 81.8%, failed. Of 192 osteopathic graduates, 142 passed and 50, or 26%, failed. Graduates of 218 foreign faculties of medicine were examined by 36 boards. There were 1,783 such graduates, with 771, or 43.2%, failures.

Graduates of the University of Miami School of Medicine at Coral Gables, Fla., appeared for the first time in state board examinations in 1956. This school graduated its first class of doctors of medicine last year. Twenty-four graduates were examined in Florida and two in Georgia, and all passed. Graduates of the University of Puerto Rico School of Medicine also appeared for the first time before state medical examining boards last year. Thirteen graduates were examined in five states, of whom two, or 15.4%, failed.

Totals for the six categories are given in table 5. It will be noted that 4.5% of the graduates of existing approved medical schools in the United States and 11.5% of the graduates of Canadian schools failed. The greatest number of failures fell within three groups: foreign faculties of medicine, unapproved medical schools, and schools of osteopathy. Those in these three groups registered by medical boards are separately discussed in later tables.

TABLE 3.—*Licenses Issued, 1935-1956*

Year	Examination	Reciprocity and Endorsement	Total
1935	5,725	2,194	7,919
1936	6,276	2,773	9,049
1937	6,629	3,205	9,834
1938	6,557	2,956	9,513
1939	6,400	2,872	9,272
1940	6,289	2,866	9,155
1941	6,057	2,762	8,819
1942	6,152	2,469	8,621
1943	6,062	2,340	8,402
1944	7,080	2,596	9,676
1945	5,580	3,622	9,202
1946	6,567	9,669	16,236
1947	6,763	7,701	14,464
1948	5,997	7,595	13,592
1949	5,252	6,929	12,181
1950	5,454	6,755	12,209
1951	5,712	6,225	11,938
1952	6,212	7,016	13,228
1953	6,565	7,869	14,434
1954	6,827	8,202	15,029
1955	7,379	7,461	14,840
1956	7,122	7,421	14,543
Totals	138,658	113,498	252,156

TABLE 4.—*Graduates of Medical Schools in Canada Examined for Licensure in the United States, 1956*

	Examined	Passed	Failed
Alabama	1	1	0
California	27	23	4
Connecticut	6	3	3
Delaware	1	1	0
Florida	9	7	2
Illinois	4	3	1
Indiana	2	2	0
Iowa	1	1	0
Kentucky	1	1	0
Louisiana	1	1	0
Maine	12	11	1
Maryland	9	9	0
Massachusetts	2	2	0
Michigan	15	15	0
Minnesota	15	15	0
Missouri	3	2	1
New Hampshire	4	3	1
New Jersey	1	1	0
New York State	13	8	5
North Carolina	1	0	1
North Dakota	13	13	0
Ohio	3	3	0
Oregon	2	2	0
Pennsylvania	6	6	0
Texas	5	5	0
Vermont	1	1	0
Virginia	3	3	0
Washington	3	3	0
Wisconsin	1	1	0
Totals	165	146	19

TABLE 5.—*Source of Candidates Examined for Licensure in the United States, 1956*

Medical Schools	No. of Schools	No. Examined	No. Passed	No. Failed	% Failed
Approved schools in United States	76	6,149	5,870	279	4.5
Approved in Canada	11	165	146	19	11.5
Extinct	2	9	0	9	100.0
Foreign	218	1,783	1,012	771	43.2
Unapproved schools	5	44	9	35	81.8
Schools of osteopathy	8	192	142	50	26.0
Totals		8,342	7,179	1,163	13.9

Consolidated Results of Examinations

The combined results of two groups of examinations, the state medical board examinations and part 3 of the examinations of the National Board of Medical Examiners, are given in table 6. This table represents a comprehensive analysis of the performance of physicians from individual schools. It will be noted that in some instances schools having failures before state licensing boards had few, if any, failures before the National Board.

In 1956 there were 6,149 graduates of approved medical schools in the United States examined by state boards, of whom 4.5% (279) failed. In the same calendar year 2,106 graduates of these schools were tested in the final examination of the National Board, and 12 failed. In both groups, a total of 8,155 were examined, of whom 7,864 passed and 291, or 3.6%, failed.

Of the graduates of Canadian medical schools, 11.5% failed state board examinations in the United States and one failed the National Board test. Only 19 graduates of foreign medical schools were examined by the National Board, while 1,783 were examined by state boards. The National Board did not examine in 1956 any graduate of an approved medical school no longer in existence. There were also none examined by the National Board in the unapproved medical school or osteopathic categories. There is no comparison to be made in the three groups last mentioned.

TABLE 6.—*Combined Results of Examinations of State Boards and the National Board of Medical Examiners, 1956*

School	Results by Medical Examining Board Tests		Part 3 Examination of National Board of Medical Examiners		Total Examined	Totals		% Failed
	P	F	P	F		P	F	
ical College of Alabama	85	2	0	0	87	85	2	2.3
ersity of Arkansas ...	70	1	7	0	78	77	1	1.3
ge of Med. Evangelists	86	2	31	0	119	117	2	1.7
. of Southern Calif. ...	67	0	1	0	68	68	0	0.0
ford University	56	1	11	0	68	67	1	1.5
. of California, L. A...	31	0	8	0	39	39	0	0.0
. of California, S. F...	81	0	4	0	85	85	0	0.0
ersity of Colorado	75	1	2	0	78	77	1	1.3
University	11	2	75	2	90	86	4	4.4
rgetown University	33	1	78	1	113	111	2	1.8
rge Washington Univ...	27	1	69	1	98	96	2	2.0
ard University	51	13	5	0	69	56	13	18.6
ersity of Miami	26	0	0	0	26	26	0	0.0
ry University	110	4	0	0	114	110	4	3.5
ical College of Georgia.	76	7	1	0	84	77	7	8.3
ago Medical School ...	24	2	63	0	89	87	2	2.2
hwestern University ...	108	9	51	1	169	159	10	5.9
ch School of Medicine.	73	4	31	0	108	104	4	3.7
ersity of Chicago	42	4	50	0	96	92	4	4.2
ersity of Illinois	158	9	31	0	198	189	9	4.5
ana University	154	7	2	0	163	156	7	4.3
e University of Iowa...	116	3	7	0	126	123	3	2.4
ersity of Kansas	117	1	4	0	122	121	1	0.8
ersity of Louisville ...	102	5	3	0	110	105	5	4.5
isiana State University.	102	2	5	0	109	107	2	1.8
ane University	162	13	0	0	175	162	13	7.4
n Hopkins University ..	82	5	8	0	95	90	5	5.3
ersity of Maryland ...	111	7	6	0	124	117	7	5.7
ton University	14	4	74	1	93	88	5	5.4
vard Medical School ...	41	1	109	0	151	150	1	0.7
s College Med. School.	18	3	112	0	133	130	3	2.3
ersity of Michigan	191	3	7	0	201	198	3	1.5
ne University	71	4	0	0	75	71	4	5.3
ersity of Minnesota ...	127	2	3	0	132	130	2	1.5
Louis University	132	6	6	0	144	138	6	4.2
hington University	109	4	18	0	131	127	4	3.1
ghton University	75	3	9	0	87	84	3	3.4
ersity of Nebraska	92	3	3	0	98	95	3	3.1
ny Medical College	11	0	52	0	63	63	0	0.0
e Univ. N.Y., Brooklyn	26	1	130	0	157	156	1	0.6
ersity of Buffalo	12	3	66	1	82	78	4	4.9
mbia University	31	1	109	1	142	140	2	1.4
nell University	35	2	68	1	106	103	3	2.8
York Medical College..	43	9	122	1	175	165	10	5.7
York University	21	10	135	1	167	156	11	6.6
versity of Rochester ...	22	1	43	0	66	65	1	1.5
e Univ., N. Y., Syracuse	8	1	75	0	84	83	1	1.2
v. of North Carolina ...	57	4	0	0	61	57	4	6.6
e University	118	10	9	0	137	127	10	7.3
wman-Gray Sch. of Med.	54	2	0	0	56	54	2	3.6
versity of Cincinnati ...	97	7	2	0	106	99	7	6.6
stern Reserve University	78	2	13	0	93	91	2	2.1
o State University	160	4	2	0	166	162	4	2.4
versity of Oklahoma ...	99	2	2	0	103	101	2	1.9
versity of Oregon	65	2	16	0	83	81	2	2.4
nemann Med. College ..	94	7	49	0	150	143	7	4.7
erson Medical College ..	170	4	18	0	192	188	4	2.1
uple University	103	5	43	0	151	146	5	3.3
versity of Pennsylvania	108	1	33	0	142	141	1	0.7
man's Medical College..	28	0	22	0	50	50	0	0.0
versity of Pittsburgh ..	101	3	7	0	111	108	3	2.7
l. Col. of So. Carolina..	65	0	0	0	65	65	0	0.0
versity of Tennessee....	221	10	2	0	233	223	10	4.1
harry Medical College ...	73	10	0	0	83	73	10	12.0
nderbilt University	48	2	1	1	52	49	3	5.8
thwestern Med. School..	104	3	0	0	107	104	3	2.8
versity of Texas	156	7	0	0	163	156	7	4.3
ylor University	76	1	1	0	78	77	1	1.3
versity of Utah	48	2	0	0	50	48	2	4.0
versity of Vermont	15	1	28	0	44	43	1	2.3
versity of Virginia	71	5	1	0	77	72	5	6.5
ical College of Virginia	110	10	8	0	128	118	10	7.8
versity of Washington..	50	0	2	0	52	52	0	0.0
versity of Wisconsin ...	84	0	5	0	89	89	0	0.0
rquette University	91	6	11	0	108	102	6	5.6
versity of Puerto Rico..	11	2	25	0	38	36	2	5.3
Subtotals: U. S. schools..	5,870	279	1,994	12	8,155	7,864	291	3.6
versity of Alberta	7	1	0	0	8	7	1	12.5
v. of British Columbia.	0	0	1	0	1	1	0	0.0
versity of Manitoba ...	27	1	0	0	28	27	1	3.6
housie University	7	1	3	0	11	10	1	9.1
en's University	10	1	5	0	16	15	1	6.3
versity of Ottawa	16	1	3	0	20	19	1	5.0
v. of Western Ontario..	7	1	1	0	9	8	1	11.1
versity of Toronto	20	3	8	0	31	28	3	9.7
Gill University.....	30	3	36	1	70	66	4	5.8
versity of Montreal	10	2	1	0	13	11	2	15.4
val University	12	5	1	0	18	13	5	27.8
Subtotals: Can. schools..	146	19	59	1	225	205	20	8.9
tinct medical schools....	0	9	0	0	9	0	9	100.0
approved med. schools..	9	35	0	0	44	9	35	81.8
teopathic schools	142	50	0	0	192	142	50	26.0
reign medical faculties...	1,012	771	19	0	1,802	1,031	771	42.7
Totals	7,179	1,163	2,072	13	10,427	9,251	1,176	11.3

The total of all candidates examined by state boards was 8,342, of whom 7,179 passed and 1,163, or 13.9%, failed. For both groups—state boards and the National Board—10,427 were examined; 9,251 passed and 1,176, or 11.3%, failed.

Failures in Medical Licensure Examinations

Licensure failures in 1956 before state medical licensing boards are further analyzed in table 7. In this tabulation is given the number examined in each state, the number who failed the examination, and the percentage of failures.

TABLE 7.—*Failures in Medical Licensure Examinations*

State in Which Examined	No. Examined	No. Failed	% Failures
Alabama	88	0	0.0
Arizona	19	1	5.3
Arkansas	68	1	1.5
California	607	59	9.8
Colorado	95	1	1.1
Connecticut	67	27	40.3
Delaware	13	1	7.7
District of Columbia	19	1	5.3
Florida	723	179	24.7
Georgia	203	0	0.0
Idaho	3	0	0.0
Illinois	529	205	38.7
Indiana	188	7	3.7
Iowa	139	8	5.8
Kansas	122	0	0.0
Kentucky	95	0	0.0
Louisiana	242	0	0.0
Maine	61	19	31.1
Maryland	327	37	11.3
Massachusetts	78	45	57.7
Michigan	319	0	0.0
Minnesota	212	1	0.5
Mississippi	101	0	0.0
Missouri	256	12	4.6
Montana	6	1	16.7
Nebraska	120	2	1.7
Nevada	2	0	0.0
New Hampshire	18	5	27.8
New Jersey	95	14	14.7
New Mexico	5	2	40.0
New York	693	358	51.6
North Carolina	221	12	5.4
North Dakota	30	2	6.7
Ohio	577	58	10.0
Oklahoma	91	0	0.0
Oregon	44	2	4.5
Pennsylvania	535	0	0.0
Rhode Island	52	8	15.4
South Carolina	65	0	0.0
South Dakota	9	0	0.0
Tennessee	179	0	0.0
Texas	393	28	7.1
Utah	19	3	15.8
Vermont	4	0	0.0
Virginia	276	42	15.2
Washington	63	0	0.0
West Virginia	26	0	0.0
Wisconsin	154	0	0.0
Wyoming	7	0	0.0
Alaska, Guam, Hawaii, and Puerto Rico	84	22	26.2
Totals	8,342	1,163	13.9

The following nine approved schools in the United States had no failures among their graduates in medical licensing examinations last year:

	No. of Graduates Examined	No. of States in Which Examinations Were Taken
University of Southern California	67	2
University of California, San Francisco	81	3
University of California, Los Angeles	31	1
University of Miami	26	2
Albany Medical College	11	5
Woman's Medical College	28	11
Medical College of South Carolina	65	2
University of Washington	50	15
University of Wisconsin	84	13

Reciprocates with, or Endorses Certificates Granted by

Marginal Number	The Examining Board of	Alabama	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Dist. of Columbia	Florida	Georgia	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	Marginal Number
1	Alabama	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
2	Arizona	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
3	Arkansas	+	+	..	+	+	+	..	+	..	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	..	+	+	..	+	3
4	California	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
5	Colorado	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
6	Connecticut	..	..	..	..	..	..	..	+	..	..	+	+	+	..	+	..	+	+	+	+	+	..	..	..	..	..	..	+	..	..	6
7	Delaware	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7
8	District of Columbia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8
9	Florida	No reciprocity or endorsement policies										..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9
10	Georgia	+	..	+	+	+	..	..	+	..	..	..	+	+	+	+	+	+	+	+	+	+	+	+	+	..	+	+	+	+	10
11	Idaho	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11
12	Illinois	+	..	+	+	+	+	..	..	..	+	..	..	+	+	+	+	+	..	+	+	+	+	..	+	+	..	+	+	..	+	12
13	Indiana	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13
14	Iowa	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	14
15	Kansas	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
16	Kentucky	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16
17	Louisiana	+	+	+	+	+	+	+	+	..	+	+	+	+	+	+	+	..	+	+	+	+	+	+	+	+	+	+	+	+	+	17
18	Maine	..	..	+	+	+	+	+	+	..	+	..	..	+	+	+	+	+	..	..	+	+	+	..	+	+	+	+	+	+	+	18
19	Maryland	+	..	+	+	..	+	+	+	..	+	+	+	+	+	+	+	+	..	+	+	+	+	..	+	+	+	+	+	+	+	19
20	Massachusetts	+	..	..	..	..	+	+	+	..	+	+	..	+	+	+	+	+	..	+	+	..	..	..	+	+	..	..	+	+	+	20
21	Michigan	+	+	+	+	+	+	+	+	..	+	+	+	+	+	+	+	+	..	+	+	+	..	+	+	+	..	+	+	+	+	21
22	Minnesota	+	+[41]	+	+	+[41]	+[41]	+	+	..	+	+[41]	+	+[41]	+	+[41]	+[41]	+[41]	+	+	+[41]	+	..	+	+	+	+	+	+	+[41]	+	22
23	Mississippi	+	+	+	+	+	+	+	+	..	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23
24	Missouri	+	+	+	+	+	+	+	+	..	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	24
25	Montana	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	25
26	Nebraska	+	+	+	+	+	+	..	+	..	+	..	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	26
27	Nevada	+	..	+	+	+	..	..	+	..	+	+	+	+	+	+	+	+	..	+	+	+	+	+	+	+	+	+	..	+	+	27
28	New Hampshire	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	28
29	New Jersey	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	..	+	29
30	New Mexico	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	..	30
31	New York	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31
32	North Carolina	+	+	+	+	+	+	+	+	..	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	32
33	North Dakota	+	..	+	+	+	..	..	+	..	+	..	+	+	+	+	+	+	..	..	+	+	+	..	+	+	+	+	+	+	+	33
34	Ohio	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	34
35	Oklahoma	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	35
36	Oregon	+	+	+	+	+	+	+	..	..	+	+	+	+	+	..	+	+	+	+	..	+	+	+	+	+	+	+	+	+	+	36
37	Pennsylvania	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	37
38	Rhode Island	..	+	+	+	+	+	..	+	..	+	+	+	+	+	+	+	..	..	+	+	+	+	+	+	+	..	+	+	+	+	38
39	South Carolina	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	39
40	South Dakota	+	+	+	+	+	..	..	..	..	+	..	+	+	+	+	+	+	..	..	+	+	+	+	+	+	+	+	+	..	+	40
41	Tennessee	+	+	+	+	+	+	+	+	..	+	..	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	41
42	Texas	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	42
43	Utah	+	+	+	+	+	+	+	..	..	+	+	+	+	+	+	+	+	+	+	+	+	+	..	+	+	+	+	+	+	+	43
44	Vermont	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	44
45	Virginia	..	..	..	..	..	..	..	..	13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13	..	..	..	45
46	Washington	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	46
47	West Virginia	+	..	+	20	20	+	+	+	..	+	..	+	20	20	20	20	+	+	+	20	+	+	+	+	+	+	+	+	..	+	..	47
48	Wisconsin	+	+	+	+	+	+	+	+	..	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	48
49	Wyoming	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	49
50	Alaska	+	..	+	+	+	+	..	+	..	..	..	..	+	..	+	+	..	..	+	..	+	+	+	+	..	..	+	+	+	..	..	50
51	Canal Zone	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	51
52	Guam	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	52
53	Hawaii	No reciprocal relations										..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	53
54	Puerto Rico	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	+	..	..	+	..	+	..	..	..	..	54
55	Virgin Islands	No reciprocal relations										..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	55

This summary should be supplemented by direct communication with the

Some states have additional requirements for graduates of schools outside the United States and Canada.

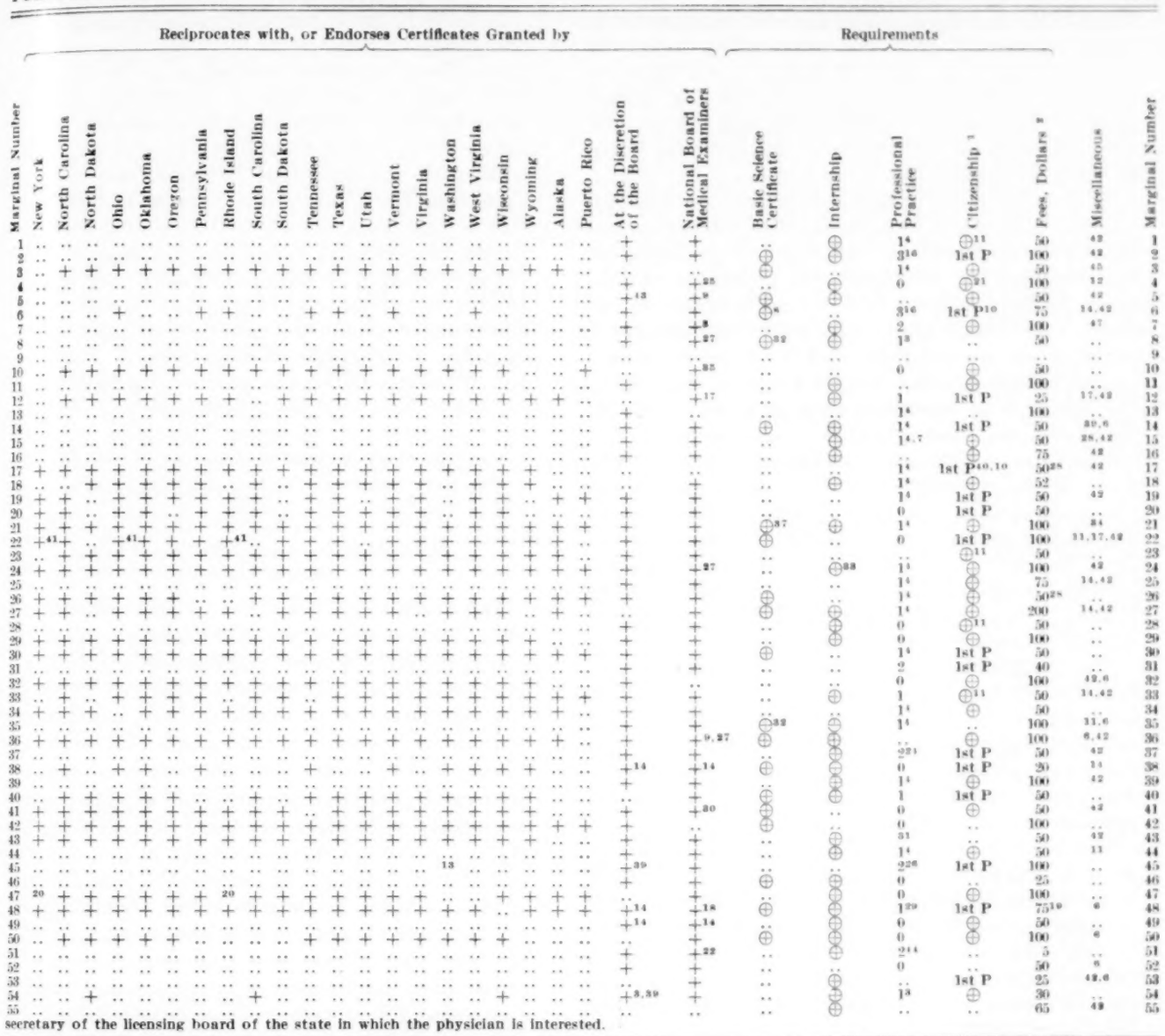
+, indicates reciprocal or endorsement relationships have been established; .. indicates no reciprocal or endorsement relationships have been established. (See column—"At the discretion of the board.")

1. 1st P, first papers required; ⊕, in citizenship column indicates full citizenship required, in other columns it implies a requirement.
2. In most cases there is a small additional recording or registration fee.
3. Year of practice after internship required.
4. Internship accepted in lieu of one year's practice.
5. Two years professional practice required.
6. All applicants must be graduates of a medical school approved by the American Medical Association.
7. Just preceding application.
8. Not required if applicant has been in practice more than 5 years.
9. Basic science certificate required either by reciprocity or examination in addition to basic science subjects of National Board.
10. Canadian citizens are required to file first papers.
11. Not applicable to citizens of Canada.
12. Oral examination required when application is based on a license dated five or more years prior to filing application.
13. No reciprocity.
14. Oral examination required.
15. Endorsement of National Board of Medical Examiners $35.
16. Actual practice for a period of three years immediately preceding date of application.
17. Practical, clinical examination required.
18. In lieu of its own examination, certificate of National Board may be accepted in whole or in part.
19. Minimum fee.
20. Licentiates of California, Colorado, Indiana, Iowa, Kansas, Massachusetts, New York, and Rhode Island accepted on reciprocal basis at discretion of board.
21. Not required if country in which applicant is licensed will admit to practice citizens of the United States licensed to practice in some

Thirty-eight schools had less than 5% and 19 had between 5 and 10% failures among their graduates. There were 10 schools with 10% or more failures in state examinations. The over-all figures and percentages for failures are modified when included with the results of the final examinations of the National Board of Medical Examiners (table 6).

It can be noted, referring to table 4, that those states with high percentages of failures examine a considerable number of foreign-trained physicians. The one exception is Florida. This state has no reciprocal provisions for medical licensure, and physicians planning semiretirement in a more ideal climate seek licensure in this state. Many of these physicians graduated from medical school in the early years of the century and experience difficulty in writing examinations.

In general, state licensing boards require the applicant to receive an over-all average of 75%, and at least 60% in any one subject. In case of failure in not more than two subjects, the applicant is permitted a second examination within 12 months. A few states consider such persons as conditioned in the subjects in which they fail. Conditioned candidates are not counted as failures in these statistics. When their grades are raised after a successful examination, they are recorded among those who passed.



secretary of the licensing board of the state in which the physician is interested.

state or on proof of requirements similar to those required by California for graduates of foreign medical schools.

22. At discretion of Health Bureau.
23. Oral examination required if applicant's state requires it.
24. If the applicant passes the examination in the state from which he transfers after the completion of his internship, no practice is required.
25. May require oral examination.
26. Internship accepted at the discretion of the board as the equivalent of two years' practice.
27. Fee, $25.
28. Fee same as applicant's state charges but not less than $50.
29. A two year internship or a year of residency is accepted.
30. Diplomates of National Board not required to have been in practice for three years.
31. Same as required of candidates of state applying for licensure.
32. Not required for licensure by reciprocity.
33. Reciprocity applicants only.
34. Supplemental examination required in certain cases when accepting the examination of a state with whom reciprocal relations have not been established.
35. Applicants issued certificates prior to October, 1953, acceptable.
36. Fee same as applicant's state charges but not less than $75.
37. For matriculants after Oct. 15, 1937.
39. Reciprocity extended at discretion of board to candidates whose qualifications would entitle them to admission to examination and who took examination equivalent to that required by this board.
40. Permanent license withheld until completion of citizenship.
41. At the discretion of the board.
42. Graduates of foreign medical schools are not accepted for licensure by reciprocity.
43. Reciprocity extended at discretion of board to states having comparable licensing requirements and which accept Colorado applicants on a substantially equal reciprocal basis.
44. Consecutive years immediately preceding application.
45. Graduates of foreign medical schools not accepted.

Of the 14,543 persons obtaining licenses in 1956, 254 failed state board tests before obtaining a license. Of these, 127 had one failure, 55 had two failures, 26 had three failures, and 18 had four or more failures. Twenty-eight physicians had failures ranging from 5 to 12 in tests before securing licensure.

Registration by Reciprocity and Endorsement

A summary of the reciprocity and endorsement policies pertaining to medical licensure is included in table 8. One state, Florida, requires all applicants for medical licensure to pass a written examination. Hawaii and the Virgin Islands do not have reciprocal relations with any state, but Hawaii will endorse physicians certified by the National Board of Medical Examiners. Twenty boards require applicants for licensure to obtain a certificate from the board of examiners in the basic sciences of the state. In the section of this report pertaining to basic science boards is included a table outlining the reciprocity, endorsement, exemption, or waiver policies of the basic science boards.

Twenty-seven states, Alaska, and Puerto Rico have reciprocal agreements with specific states. In 23 states reciprocity is extended at the discretion of the licensing board. Eighteen states, which have reciprocal

agreements, also have similar discretionary powers to endorse applicants from nonreciprocating states who present credentials that correspond with those required by their respective states in the year issued. Also in this table is a column indicating the recognition accorded the certificate of the National Board of Medical Examiners.

Additional requirements, including professional practice, citizenship, oral examination, internship, and the fee for a license by reciprocity or endorsement, are also recorded. In some states, physicians of Canadian birth are exempt from the citizenship requirement. This is indicated by footnote. Few states will accept graduates of foreign faculties of medicine on a reciprocal basis. Other requirements or exemptions are indicated by footnotes; footnote numbers are referred to in the column headed "Miscellaneous."

This chart will be made available in reprint form. It is helpful to physicians who are considering a change in location. The facts recorded in this table are intended to present merely statements of licensure policies. The information here given should be supplemented by direct communication with the licensing boards. A list of the executive officers in charge of medical licensure appears elsewhere in this report.

The procedure in issuing licenses by reciprocity or endorsement varies. Some states consider applications for licensure at any time, while others hold monthly, quarterly, or semiannual meetings. The policy in effect in each state is shown in table 24. In addition, THE JOURNAL publishes biweekly the exact dates when applications are considered.

In table 9 are presented data pertaining to the credentials accepted as the basis for licenses granted without written examination in 1956. There were 7,421 so registered on the basis of licenses issued by other boards, the certificate of the National Board of Medical Examiners, by special exemption, and by acceptance of service with an agency of the government of the United States.

California issued the greatest number of licenses by this method. In this state 1,255 were registered. New York licensed 1,019. Four other states licensed more than 275—Connecticut 297, Massachusetts 349, New Jersey 384, and Ohio 332. The largest number of candidates presenting the same type of credential were the 3,109 diplomates certified by the National Board of Medical Examiners.

There were 321 licenses that were issued in Illinois, 213 in Maryland, 223 in New York, 265 in Ohio, and 264 in Pennsylvania presented to other states for reciprocal registration. California, which issued the greatest number of licenses by reciprocity or endorsement (1,255), certified only 147 of its licentiates to other states. Figures for other states were fewer than 250. Thirty-four medical officers of one of the federal services received licenses by endorsement of military credentials in five states. Twenty-five were licensed by nine boards on the basis of a license issued in Alaska, Hawaii, or Puerto Rico; 20 by five boards on the basis of Canadian or foreign credentials; and three were licensed in the Virgin Islands by special endorsement for civilian practice.

In table 10 are reported the numbers from individual schools represented by the 7,421 reciprocity licentiates. Every approved medical school in the United States and the University of Puerto Rico had graduates licensed without written examination in 1956. All of the approved Canadian schools were so registered with one exception—the University of British Columbia. The 7,421 licentiates included 6,985 graduates of approved schools in the United States and Puerto Rico and 121 from Canadian medical schools. Licenses without written examination were obtained by 180 foreign-trained physicians in 26 states, and 24 graduates of approved medical schools no longer in operation were registered in 13 states. Twenty graduates of unapproved medical schools secured licenses in 9 states, and 91 graduates of schools of osteopathy were registered in 10 states. This table reflects the movement of physicians to states other than the one in which they obtained their professional training or in which they first established their practice.

Licentiates Representing Additions to the Medical Profession

The numbers of licentiates of 1956 who received their first license to practice medicine and surgery during the last calendar year and thus represent additions to the medical profession is shown in table 11. The compilation of this table includes candidates examined and licensed in 1956, some who were examined in previous years but whose licenses were withheld until 1956 pending completion of a required internship, citizenship, or other technicalities, and physicians not previously licensed in any state who were certified during the year on the basis of the examination of the National Board of Medical Examiners. The figures also include physicians licensed on the basis of government credentials, those who received Canadian licenses, and those licensed by special exemption. The majority represented are recent graduates.

There were 7,463 additions to the medical profession in the United States and its territories and outlying possessions. In 1956, 3,659 deaths of physicians were reported to the offices of the American Medical Association. Deducting the number of deaths in 1956 from the number of persons licensed for the first time, it will be seen that there was a net increase of 3,804 in the physician population last year.

Among the 7,463 licentiates representing additions to the medical profession in the last calendar year were 6,035 whe secured their licenses by examination and 1,428 by endorsement of credentials. The majority of the latter were diplomates of the National Board of Medical Examiners.

The numbers of first licentiates, arranged in nine geographical divisions, are compiled in table 12. The geographical divisions representing the greatest number of additions to the medical profession were the Middle Atlantic States with 1,532, the East North Central States with 1,437, and the South Atlantic States with 1,210. More than 400 were added in each of five other groups: West North Central 824, Pacific 720,

TABLE 9.—*Candidate Licensed by Reciprocity and Endorsement of Credentials, 1956*

| States Issuing Licenses by Reciprocity or Endorsement | Source of Former License or Credentials | | |

Marginal Number	SCHOOL	Alabama	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Dist. of Columbia	Florida	Georgia	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland
	Marginal Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	ALABAMA																			
1	Medical College of Alabama, Birmingham	..	..	..	2	..	..	..	..	..	1	..	..	1	..	..	1	3	..	..
	ARKANSAS																			
2	University of Arkansas School of Medicine, Little Rock	3	1	..	4	..	..	..	..	..	2	..	1	1	..	2	2	10	..	1
	CALIFORNIA																			
3	College of Medical Evangelists, Loma Linda-Los Angeles	..	..	..	12	4	..	..	4	..	2	3	2	..	..	1	3	..	..	4
4	University of Southern California School of Medicine, L. A.	..	..	..	1	..	1	..	..	..	1	..	..	..	..	..	..	1	..	1
5	Stanford University School of Medicine, San Francisco	..	1	..	9	1	1	..	1	..	..	1	2	..	..	..	..	1	1	..
6	University of California School of Medicine, San Francisco	..	2	..	6	1	..	..	1	..	..	..	..	..	..	..	..	..	..	1
7	University of California School of Medicine, Los Angeles	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	COLORADO																			
8	University of Colorado School of Medicine, Denver	..	2	1	21	..	..	..	..	..	..	1	1	..	1	..	2	..	..	..
	CONNECTICUT																			
9	Yale University School of Medicine, New Haven	..	..	..	19	..	25	..	1	..	1	..	1	..	1	..	1	..	2	4
	DISTRICT OF COLUMBIA																			
10	Georgetown University School of Medicine	1	..	..	7	..	9	..	16	..	1	..	2	..	..	..	3	..	..	29
11	George Washington University School of Medicine	1	1	..	26	1	4	1	23	..	1	..	2	..	3	..	4	..	..	30
12	Howard University College of Medicine	1	1	..	15	1	2	..	14	..	1	..	..	1	..	..	..	..	..	4
	FLORIDA																			
13	University of Miami School of Medicine, Coral Gables	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	GEORGIA																			
14	Emory University School of Medicine, Atlanta	6	..	1	1	..	2	..	..	..	1	..	..	..	..	..	..	4	..	1
15	Medical College of Georgia, Augusta	1	..	..	4	..	..	..	..	..	..	..	1	..	..	..	1	6	..	2
	ILLINOIS																			
16	Chicago Medical School	..	..	..	37	1	2	..	..	..	..	..	15	..	..	..	..	..	..	..
17	Northwestern University Medical School, Chicago	2	1	1	57	5	..	1	..	..	..	2	23	7	3	2	4	2	..	1
18	Stritch School of Medicine of Loyola University, Chicago	..	3	..	20	1	..	..	1	..	..	..	7	2	3	..	2	..	..	1
19	University of Chicago, The School of Medicine	..	3	1	31	..	..	..	1	..	1	..	8	5	2	2	..	..	1	4
20	University of Illinois College of Medicine, Chicago	1	3	1	61	4	3	..	..	..	1	3	27	10	3	..	1	..	..	3
	INDIANA																			
21	Indiana Univ. School of Medicine, Bloomington-Indianapolis	..	2	..	26	2	2	..	1	..	5	..	6	..	..	2	5	2	..	2
	IOWA																			
22	State University of Iowa College of Medicine, Iowa City	..	2	..	16	2	..	..	..	..	1	2	4	3	3	2	1	2	..	2
	KANSAS																			
23	University of Kansas School of Medicine, Lawrence-Kansas City	..	1	1	24	1	..	..	..	..	..	2	2	3	..	..	1	1	..	4
	KENTUCKY																			
24	University of Louisville School of Medicine, Louisville	3	..	..	17	1	..	..	1	..	4	..	3	8	2	..	1	3	..	2
	LOUISIANA																			
25	Louisiana State University School of Medicine, New Orleans	..	..	..	3	..	..	..	..	..	1	..	2	..	..	1	2	2	..	1
26	Tulane University School of Medicine, New Orleans	11	3	4	9	1	..	..	1	..	5	1	4	2	..	..	5	2	..	2
	MARYLAND																			
27	Johns Hopkins University School of Medicine, Baltimore	1	..	1	14	4	1	..	3	..	3	1	4	1	..	3	..	3	..	2
28	University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore	1	2	..	12	1	1	1	4	..	1	..	2	2	..	..	2	1	..	3
	MASSACHUSETTS																			
29	Boston University School of Medicine	..	..	..	13	..	6	..	2	..	..	..	2	..	..	..	2	..	5	1
30	Harvard Medical School, Boston	1	2	1	33	..	18	..	3	..	3	2	6	1	..	4	4	..	6	7
31	Tufts University School of Medicine, Boston	..	1	..	13	1	21	1	1	..	1	..	6	..	..	..	2	..	8	4
	MICHIGAN																			
32	University of Michigan Medical School, Ann Arbor	..	3	..	30	5	2	..	..	..	..	3	4	6	6	3	2	..	..	2
33	Wayne State University College of Medicine, Detroit	..	2	..	15	..	..	..	..	..	1	..	1	..	..	..	1	1	..	..
	MINNESOTA																			
34	University of Minnesota Medical School, Minneapolis	..	5	..	47	2	1	..	..	..	2	2	4	..	2	2	2	2	..	..
	MISSOURI																			
35	St. Louis University School of Medicine	1	2	1	34	3	..	..	..	..	..	..	9	9	..	..	1	2	..	1
36	Washington University School of Medicine, St. Louis	1	3	..	24	1	1	..	..	..	1	..	10	2	1	4	3	1	..	3
	NEBRASKA																			
37	Creighton University School of Medicine, Omaha	..	1	..	11	6	1	..	..	..	..	..	1	1	2	3	..	1	..	..
38	University of Nebraska College of Medicine, Omaha	..	4	1	16	9	..	..	..	..	1	..	2	2	6	5	1	2	..	1
	NEW YORK																			
39	Albany Medical College	..	..	..	7	2	3	..	1	..	..	..	2	..	..	1	1	..	1	..
40	University of Buffalo School of Medicine	..	..	..	27	..	6	..	2	..	..	1	3	..	..	..	..	..	..	1
41	Columbia University College of Physicians and Surgeons, N. Y.	1	2	..	20	1	20	1	4	..	..	..	1	1	..	1	..	..	3	7
42	Cornell University Medical College, New York	..	1	..	20	2	7	..	1	..	2	1	1	1	..	1	..	..	..	2
43	New York Medical College, Flower and Fifth Avenue Hospitals	..	..	..	26	..	26	..	5	..	..	1	1	..	..	1	..	1	2	3
44	New York University College of Medicine	..	1	..	36	1	20	..	3	..	1	..	1	..	..	3	2	..	..	5
45	State University of New York College of Med., New York City	1	2	..	26	2	24	..	1	..	1	..	6	1	..	..	2	..	1	4
46	University of Rochester School of Medicine and Dentistry	1	..	..	12	1	4	..	..	..	3	..	..	..	1	..	1	..	..	1
47	State University of New York College of Medicine, Syracuse	..	..	..	9	..	8	..	2	..	..	..	2	..	..	..	3	..	..	3
	Marginal Numbers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	
Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Alaska, Guam, Hawaii, Puerto Rico, Canal Zone	Totals	Marginal Number
..	1	..	..	..	2	..	..	..	1	..	1	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	1	..	..	..	16	1
..	1	1	1	8	1	1	..	..	..	..	1	1	..	2	..	..	1	..	1	1	2	12	..	..	..	1	..	..	..	..	62	2
2	2	2	1	3	1	1	1	..	..	1	1	1	..	3	1	5	1	..	2	1	6	2	2	..	..	6	1	..	1	3	85	3
1	2	2	1	..	..	..	1	..	..	..	4	..	..	..	..	2	1	..	..	..	..	..	..	..	..	1	..	..	..	1	21	4
..	2	4	1	..	1	..	..	..	1	..	3	..	..	..	..	..	..	..	..	..	..	..	2	..	..	2	..	1	..	1	36	5
..	2	2	..	..	..	..	..	1	1	1	3	..	..	1	1	1	1	..	..	..	1	..	2	..	..	1	..	..	..	..	29	6
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	7
..	7	2	..	2	3	1	2	..	..	3	6	..	..	1	..	1	..	..	..	..	..	..	2	..	..	..	..	2	1	..	62	8
4	3	2	..	2	..	1	1	2	1	..	20	..	..	5	1	..	3	2	..	..	..	..	1	2	1	4	..	2	..	1	113	9
9	..	1	..	..	..	..	..	1	19	..	34	..	..	3	1	1	7	3	..	..	..	1	..	..	11	..	2	1	..	..	162	10
4	2	6	1	1	..	..	..	1	3	..	9	1	1	5	1	1	6	..	..	..	..	3	5	..	10	1	4	3	..	..	165	11
1	3	..	2	1	..	..	..	..	8	..	10	2	..	8	1	..	5	..	1	..	2	1	..	..	4	..	1	1	..	..	91	12
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	13
2	..	..	1	2	..	..	..	..	..	..	1	4	..	3	..	..	1	..	1	..	5	2	..	..	2	..	1	1	..	..	42	14
..	..	1	..	..	..	..	..	..	..	..	..	5	..	..	..	..	..	..	7	..	6	2	..	..	2	..	1	..	..	..	39	15
3	..	..	..	2	..	..	..	..	9	..	41	..	..	2	..	1	1	..	..	..	..	..	..	..	..	1	..	2	..	..	117	16
2	7	8	1	3	5	1	1	..	1	1	10	1	3	5	1	2	3	1	..	..	2	5	5	..	..	7	1	15	1	..	203	17
1	6	2	..	..	2	..	..	..	1	1	1	..	..	5	..	..	..	1	1	..	..	3	1	..	..	1	..	7	2	2	77	18
4	3	1	..	2	2	..	..	..	..	..	12	..	..	6	1	1	3	..	..	..	3	1	..	..	2	3	1	..	1	..	106	19
..	9	2	..	4	1	2	2	..	4	2	3	..	2	3	2	3	..	..	..	1	3	7	1	..	1	5	1	8	..	1	193	20
2	6	1	3	2	..	3	..	..	2	1	6	..	..	11	2	1	3	..	1	..	..	6	..	..	3	4	1	1	..	2	116	21
1	11	4	..	7	..	4	..	..	..	1	2	..	..	3	..	4	1	..	..	1	..	1	1	..	..	7	..	6	1	1	96	22
..	1	3	1	23	1	1	..	..	..	..	..	..	..	2	3	..	1	..	..	..	1	3	..	..	1	6	3	..	1	..	91	23
1	6	2	..	2	..	1	.	..	1	1	7	2	..	5	1	..	5	..	..	..	5	2	..	..	3	..	3	1	..	..	93	24
..	2	..	3	1	..	..	..	..	..	..	..	1	2	..	..	1	..	..	..	..	1	8	..	..	2	1	1	..	..	..	35	25
2	1	3	10	3	..	..	1	..	2	1	8	4	..	5	3	..	1	..	..	..	8	14	..	..	4	4	1	..	..	..	125	26
6	5	..	..	..	..	..	..	..	2	..	6	2	..	10	..	2	6	1	2	..	..	4	1	1	4	1	1	1	1	1	98	27
4	2	1	..	1	..	..	..	..	4	1	7	2	..	3	..	..	4	..	1	..	2	3	1	1	3	1	6	2	..	..	82	28
35	4	1	..	1	..	..	..	3	4	..	11	..	..	3	1	..	..	1	2	..	..	1	..	..	..	..	..	..	..	..	98	29
77	11	5	1	3	..	..	..	8	8	1	27	1	..	15	4	2	6	2	..	..	2	3	2	1	3	7	3	3	..	1	287	30
63	2	..	..	2	..	..	..	8	2	..	24	..	..	5	..	1	3	5	..	..	..	2	1	..	2	3	1	..	1	1	185	31
..	3	4	..	..	1	1	3	..	2	..	6	4	..	11	1	2	4	..	1	..	..	3	1	..	1	3	2	2	..	2	123	32
..	..	1	..	..	..	..	..	..	1	..	..	..	..	2	..	..	2	..	..	..	..	1	..	..	1	..	..	..	1	..	30	33
..	5	4	..	..	..	1	1	..	1	1	4	1	1	..	3	4	..	1	..	..	1	1	..	..	1	12	..	6	..	..	119	34
4	9	1	..	..	1	..	..	..	5	..	2	..	..	23	..	2	1	..	..	1	..	1	..	..	..	11	..	1	1	..	126	35
3	2	1	..	2	..	1	..	..	1	..	7	1	..	2	1	2	2	..	1	1	2	2	..	..	2	3	2	1	1	4	99	36
..	1	7	..	1	..	6	1	..	..	2	..	..	..	4	..	2	..	..	..	..	..	1	..	..	..	4	1	3	..	1	61	37
1	7	9	..	6	6	1	1	..	..	1	3	..	1	1	1	5	1	..	..	1	..	5	..	..	..	13	3	1	2	..	119	38
3	..	1	..	1	..	..	1	..	5	1	28	..	..	2	..	1	3	..	..	..	..	..	..	..	1	1	1	..	..	..	67	39
1	..	3	1	..	..	..	..	..	3	1	55	..	..	7	..	..	4	..	1	..	..	2	..	..	..	1	..	1	..	2	122	40
8	3	5	..	3	..	..	..	3	19	..	69	1	..	7	..	..	6	..	..	..	..	..	..	1	1	2	1	1	..	2	194	41
8	3	2	..	2	..	..	..	1	14	1	39	..	..	3	..	..	8	1	..	..	1	2	1	4	2	3	2	1	..	..	137	42
7	..	3	..	1	..	..	..	..	26	..	65	..	..	4	1	1	3	2	1	..	..	3	1	..	..	..	1	2	..	..	187	43
9	2	2	..	1	..	..	1	..	25	1	123	..	..	1	1	1	6	1	..	..	1	..	1	1	5	1	1	1	..	1	250	44
5	2	3	..	1	..	..	..	..	19	..	104	..	..	4	..	1	5	..	1	..	..	2	..	..	1	2	2	..	..	..	223	45
4	5	3	..	2	2	1	..	1	1	..	29	..	..	6	..	1	3	..	1	..	1	1	1	..	..	3	1	3	2	..	95	46
4	1	..	..	..	..	..	..	2	3	1	56	..	..	2	..	..	1	..	..	..	..	1	..	1	..	1	1	2	..	..	103	47
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	

Marginal Number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Marginal Number		Alabama	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Dist. of Columbia	Florida	Georgia	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland
	NORTH CAROLINA																			
48	University of North Carolina School of Medicine, Chapel Hill	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
49	Duke University School of Medicine, Durham	2	1	..	5	1	1	..	1	..	2	..	..	..	..	..	1	..	..	4
50	Bowman Gray Sch. of Med. of Wake For. Col., Winston-Salem	1	..	..	4	1	1	..	1	..	..	..	..	2	..	..	..	..	..	2
	OHIO																			
51	University of Cincinnati College of Medicine	2	2	1	30	1	5	..	..	..	1	1	1	3	..	1	9	..	1	2
52	Western Reserve University School of Medicine, Cleveland	..	1	..	24	1	5	..	1	..	..	..	1	1	1	..	5	..	..	2
53	Ohio State University College of Medicine, Columbus	..	1	..	26	3	..	..	1	..	1	..	2	3	..	..	3	..	..	1
	OKLAHOMA																			
54	University of Oklahoma School of Medicine, Oklahoma City	1	1	4	9	5	..	..	1	..	1	..	..	..	..	8	2	1	..	..
	OREGON																			
55	University of Oregon Medical School, Portland	..	2	..	30	2	2	..	..	..	..	3	1	..	..	..	..	2	..	..
	PENNSYLVANIA																			
56	Hahnemann Medical College and Hospital of Philadelphia	..	2	..	13	3	1	..	3	..	1	..	1	..	..	..	1	2	..	5
57	Jefferson Medical College of Philadelphia	1	..	..	15	..	3	2	1	..	1	..	3	4	..	2	..	2	..	1
58	Temple University School of Medicine, Philadelphia	1	1	..	24	..	3	..	2	..	1	..	3	1	..	..	2	..	1	5
59	University of Pennsylvania School of Medicine, Philadelphia	..	3	..	17	1	9	..	..	..	1	..	3	2	..	2	4	..	1	4
60	Woman's Medical College of Pennsylvania, Philadelphia	..	1	..	3	1	4	..	2	..	..	..	..	..	..	..	..	..	..	3
61	University of Pittsburgh School of Medicine	..	..	..	9	..	..	..	3	..	1	..	3	2	..	..	3	2	..	1
	SOUTH CAROLINA																			
62	Medical College of South Carolina, Charleston	..	..	..	3	1	..	..	..	..	5	..	1	2	1	..	2	4	..	3
	TENNESSEE																			
63	University of Tennessee College of Medicine, Memphis	8	..	5	14	2	..	..	..	..	15	1	2	5	..	1	11	11	1	..
64	Meharry Medical College, Nashville	2	..	1	18	1	..	..	5	..	4	..	4	5	..	2	1	..	..	2
65	Vanderbilt University School of Medicine, Nashville	8	..	..	5	1	2	..	..	..	3	..	..	..	1	..	6	3	1	1
	TEXAS																			
66	University of Texas Southwestern Medical School, Dallas	..	1	1	7	..	..	..	..	..	..	..	..	..	..	1	..	2	..	..
67	University of Texas Medical Branch, Galveston	..	..	..	9	1	..	..	..	..	..	1	2	2	..	1	2	4	..	2
68	Baylor University College of Medicine, Houston	..	..	..	10	2	..	..	1	..	..	..	3	..	..	..	1	2	..	1
	UTAH																			
69	University of Utah School of Medicine, Salt Lake City	..	3	..	10	..	3	..	..	..	..	5	1	..	..	..	..	1	..	..
	VERMONT																			
70	University of Vermont College of Medicine, Burlington	..	..	..	9	..	8	..	3	..	..	..	..	1	1	..	1	..	3	1
	VIRGINIA																			
71	University of Virginia School of Medicine, Charlottesville	1	2	2	3	..	4	1	2	..	2	1	1	1	..	1	4	2	..	4
72	Medical College of Virginia, Richmond	1	1	..	9	..	4	..	3	..	3	..	2	2	..	1	2	..	..	1
	WASHINGTON																			
73	University of Washington School of Medicine, Seattle	..	..	..	7	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..
	WISCONSIN																			
74	University of Wisconsin Medical School, Madison	..	..	1	15	2	..	..	..	..	..	..	3	3	1	..	1	..	..	1
75	Marquette University School of Medicine, Milwaukee	..	1	1	16	3	1	..	4	..	..	1	7	3	..	2	2	1	..	..
	PUERTO RICO																			
76	University of Puerto Rico School of Medicine, San Juan	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..
	CANADA																			
77	University of Alberta Faculty of Medicine, Edmonton	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
78	University of British Columbia Faculty of Med., Vancouver	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
79	University of Manitoba Faculty of Medicine, Winnipeg	..	..	..	5	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..
80	Dalhousie University Faculty of Medicine, Halifax	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
81	Queen's University Faculty of Medicine, Kingston	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
82	University of Ottawa Faculty of Medicine	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
83	University of Western Ontario Faculty of Medicine, London	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
84	McGill University Faculty of Medicine, Montreal	..	1	..	8	..	3	..	..	..	2	..	2	1	..	..	..	2	1	2
85	University of Toronto Faculty of Medicine	..	..	..	10	..	..	..	2	..	1	..	..	..	1	..	..	..	1	..
86	University of Montreal Faculty of Medicine	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
87	Laval University Faculty of Medicine, Quebec	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..
	OTHERS																			
88	Foreign medical faculties	..	1	..	..	..	16	..	12	..	6	..	..	9	1	..	1	..	4	1
89	Extinct medical schools	1	..	..	6	..	..	1	..	..	1	1	..	..	..	..	3	..	..	..
90	Unapproved medical schools	..	..	..	2	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
91	Schools of osteopathy	..	..	..	..	12	..	..	..	..	..	..	..	11	..	..	..	..	..	..
92	Totals	67	87	31	1,255	112	297	9	146	0	101	41	228	135	48	65	136	95	45	198
	Marginal Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

West South Central 624, East South Central 469, and New England 407. The Mountain States added 175 and the territories and possessions 65.

In the 22 years from 1935 to 1956, inclusive, there were 142,627 new additions to the medical profession as determined by the number who received their first license. Figures for each year during this period are presented in table 13. Of the 142,627 in this group, 119,225 were licensed after written examination and 23,402 by endorsement of credentials. The total number of licenses issued in the same period (table 3) was 252,156.

20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	
Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Alaska, Guam, Hawaii, Puerto Rico, Canal Zone	Totals	Marginal Number
..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..	..	..	..	..	3	48
3	2	2	..	2	..	..	..	..	2	1	6	4	..	4	..	..	2	1	3	..	1	1	1	..	5	1	1	..	..	..	60	49
..	..	..	..	..	..	..	..	..	2	..	1	1	..	1	..	..	..	..	5	..	3	..	..	..	..	..	1	1	..	..	27	50
2	2	..	1	3	..	..	..	..	3	2	1	2	..	..	..	2	3	..	..	..	2	3	..	..	2	1	1	..	1	..	91	51
11	7	1	..	1	..	1	..	..	2	..	6	1	..	2	..	1	3	1	..	..	1	2	..	..	..	3	1	1	..	..	87	52
1	11	2	1	2	..	..	1	..	..	2	1	1	..	..	.	1	2	..	..	..	..	4	..	..	..	1	2	..	..	..	73	53
..	1	2	..	3	..	..	..	..	..	2	1	2	..	5	2	2	1	..	..	..	1	11	1	..	4	1	..	..	..	..	72	54
1	1	1	..	1	1	1	..	..	..	1	1	..	..	1	..	16	1	..	..	..	..	1	..	..	..	33	..	..	..	1	103	55
2	3	2	..	..	..	..	..	1	23	3	12	..	..	9	..	..	6	1	..	..	..	2	..	..	..	..	2	..	..	1	99	56
6	7	..	1	2	..	1	..	2	18	1	14	3	1	11	..	..	7	1	1	..	1	3	2	..	4	..	3	1	..	1	126	57
2	2	1	..	2	2	1	..	1	10	..	18	5	1	7	..	2	14	..	..	1	..	3	2	..	4	3	..	2	..	4	131	58
5	4	5	2	1	..	1	1	1	25	..	18	2	..	8	..	1	8	..	..	..	1	6	..	..	3	2	6	1	..	2	150	59
1	..	1	..	1	1	..	..	..	3	1	5	..	..	1	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	2	32	60
3	1	..	..	1	..	..	..	..	2	..	4	1	1	7	..	..	5	..	..	..	..	1	..	..	3	2	3	2	..	..	60	61
1	..	..	..	1	..	..	1	..	..	..	..	5	..	3	..	..	..	..	..	..	3	2	1	..	1	..	..	..	..	..	40	62
..	4	3	5	3	..	..	..	..	1	1	2	9	..	4	5	2	3	..	..	..	7	14	..	..	5	2	..	..	..	..	146	63
..	3	1	3	2	..	..	..	..	4	..	11	..	..	12	1	..	2	..	1	..	2	..	..	..	2	1	..	2	..	..	92	64
..	1	1	3	1	..	..	..	..	1	..	2	2	..	1	..	..	1	..	1	..	1	5	..	..	4	2	1	2	..	..	60	65
..	1	..	..	..	..	..	..	..	1	..	..	..	1	4	3	1	2	..	1	..	..	..	1	..	1	2	..	..	..	..	30	66
1	3	4	1	3	..	1	1	..	1	4	2	..	1	..	..	..	..	..	1	..	..	..	..	..	1	2	..	..	1	..	51	67
1	4	5	..	3	..	..	1	..	..	2	4	..	..	2	3	..	1	..	..	..	..	..	..	..	1	2	2	..	..	..	51	68
2	1	..	..	..	2	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	2	5	..	..	1	..	..	..	..	37	69
8	3	..	..	2	..	..	..	2	4	..	14	..	..	2	..	..	2	2	..	..	2	..	..	8	..	..	..	..	..	..	76	70
..	..	..	..	..	..	..	..	..	..	1	9	4	1	..	2	1	1	..	..	..	2	3	..	..	2	1	1	..	1	..	60	71
2	1	1	..	..	..	..	1	..	..	1	2	4	1	1	1	..	3	..	2	..	3	5	..	..	3	1	6	..	..	..	67	72
..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	1	..	..	..	..	14	..	..	..	..	27	73
..	5	2	1	1	..	..	..	..	..	..	2	..	..	1	1	..	1	..	..	..	..	3	..	..	1	6	..	7	..	1	59	74
2	3	4	..	..	..	..	..	..	4	..	10	..	1	3	..	..	2	..	1	..	1	..	..	..	..	2	1	2	1	..	79	75
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	5	76
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	4	77
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	2	78
..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	..	..	..	..	12	79
1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	3	80
..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	81
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	3	82
..	1	2	1	..	..	..	..	..	2	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	10	83
5	1	3	..	..	..	1	..	..	1	..	6	..	..	1	..	..	..	..	..	..	..	1	..	1	1	2	2	1	..	..	48	84
..	2	1	..	..	..	..	..	1	..	..	3	..	..	4	..	..	..	..	..	..	..	..	..	..	..	2	..	1	..	..	29	85
..	..	.	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	86
..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	4	87
4	14	..	..	2	..	..	..	5	42	2	5	1	..	27	..	..	..	2	..	1	3	4	..	2	..	5	..	8	..	2	180	88
..	..	..	..	..	..	..	..	..	1	..	..	..	..	3	..	1	1	..	1	..	..	2	..	..	..	..	..	2	..	..	24	89
..	1	..	..	1	..	..	..	1	4	..	1	..	..	..	..	..	..	..	..	..	..	8	..	..	..	..	..	1	..	..	20	90
4	..	..	..	..	..	..	..	1	28	..	4	..	..	13	..	2	..	..	..	..	..	13	..	..	..	..	..	3	..	..	91	91
349	234	150	47	133	36	34	23	47	384	48	1,019	81	18	332	50	84	186	29	42	9	90	212	45	24	122	226	84	121	20	46	7,421	
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	

Registration of Physicians, 1904-1956

A tabulation of total numbers of physicians registered for 53 years from 1904 to 1956, inclusive, is given in table 14. This study contains figures pertaining to the number of physicians examined and registered by written examination, the annual percentage of failures, the number registered annually by reciprocity or endorsement of credentials, and the total registered. The number of physicians registered annually from 1904 to 1933 shows slight fluctuation, except in 1918, when only 4,231 were licensed,

the lowest registration in 53 years. This decrease was due to a sudden withdrawal of physicians from civilian life in World War I. After 1933 there was an upward trend, except during the years 1940 to 1943, inclusive. The marked increase in 1943 was the result of the acceleration of the medical school curriculum and the efforts on the part of medical educators of the country to maintain a steady flow of physicians for both civilian and medical practice. The greatest number of physicians registered in any year was in 1946. The licensure of medical officers by endorsement of credentials on their return from military service and the original licensure of physicians who had entered military service on completion of the internship accounts in large measure for the increase that almost doubled the registration of the previous year 1945.

TABLE 11.—*Licentiates Representing Additions to the Medical Profession, 1956*

	Examination	Reciprocity and Endorsement	Total
Alabama	88	3	91
Arizona	12	1	13
Arkansas	65	0	65
California	459	140	599
Colorado	101	11	112
Connecticut	34	42	76
Delaware	5	0	5
District of Columbia	9	42	51
Florida	140	0	140
Georgia	195	1	196
Idaho	3	1	4
Illinois	278	56	334
Indiana	174	2	176
Iowa	79	0	79
Kansas	119	2	121
Kentucky	96	6	102
Louisiana	209	0	209
Maine	38	14	52
Maryland	270	14	284
Massachusetts	19	169	188
Michigan	281	7	288
Minnesota	195	23	218
Mississippi	101	0	101
Missouri	240	12	252
Montana	5	4	9
Nebraska	118	0	118
Nevada	1	0	1
New Hampshire	11	8	19
New Jersey	51	59	110
New Mexico	3	2	5
New York	225	674	899
North Carolina	192	0	192
North Dakota	26	1	27
Ohio	488	34	522
Oklahoma	10	2	12
Oregon	40	11	51
Pennsylvania	503	20	523
Rhode Island	38	12	50
South Carolina	94	0	94
South Dakota	9	0	9
Tennessee	173	2	175
Texas	337	1	338
Utah	16	7	23
Vermont	14	8	22
Virginia	221	2	223
Washington	63	7	70
West Virginia	20	5	25
Wisconsin	113	4	117
Wyoming	7	1	8
Alaska	0	1	1
Canal Zone	0	2	2
Hawaii	7	8	15
Guam	0	0	0
Puerto Rico	40	7	47
Virgin Islands	0	0	0
Totals	6,035	1,428	7,463

TABLE 12.—*Licentiates Representing Additions to the Medical Profession Grouped in Geographical Divisions, 1956*

	Examination	Reciprocity and Endorsement	Total
New England			
Maine	38	14	52
New Hampshire	11	8	19
Vermont	14	8	22
Massachusetts	19	169	188
Rhode Island	38	12	50
Connecticut	34	42	76
Totals	154	253	407
Middle Atlantic			
New York	225	674	899
New Jersey	51	59	110
Pennsylvania	503	20	523
Totals	779	753	1,532
East North Central			
Ohio	488	34	522
Indiana	174	2	176
Illinois	278	56	334
Michigan	281	7	288
Wisconsin	113	4	117
Totals	1,334	103	1,437
West North Central			
Minnesota	195	23	218
Iowa	79	0	79
Missouri	240	12	252
North Dakota	26	1	27
South Dakota	9	0	9
Nebraska	118	0	118
Kansas	119	2	121
Totals	786	38	824
South Atlantic			
Delaware	5	0	5
Maryland	270	14	284
District of Columbia	9	42	51
Virginia	221	2	223
West Virginia	20	5	25
North Carolina	192	0	192
South Carolina	94	0	94
Georgia	195	1	196
Florida	140	0	140
Totals	1,146	64	1,210
East South Central			
Kentucky	96	6	102
Tennessee	173	2	175
Alabama	88	3	91
Mississippi	101	0	101
Totals	458	11	469
West South Central			
Arkansas	65	0	65
Louisiana	209	0	209
Oklahoma	10	2	12
Texas	337	1	338
Totals	621	3	624
Mountain			
Montana	5	4	9
Idaho	3	1	4
Wyoming	7	1	8
Colorado	101	11	112
New Mexico	3	2	5
Arizona	12	1	13
Utah	16	7	23
Nevada	1	0	1
Totals	148	27	175
Pacific			
Washington	63	7	70
Oregon	40	11	51
California	459	140	599
Totals	562	158	720
Territories and Possessions			
Alaska, Canal Zone, Guam, Hawaii, Puerto Rico, and Virgin Islands	47	18	65
Totals	6,035	1,428	7,463

In the years since 1946, the numbers registered decreased annually until 1952, although they far exceeded the prewar totals. The last four years has shown an increase in the number of physicians registered. The number registered in 1956 was slightly lower than in the previous year.

The highest percentage of failures was 21.7 in 1908. Many of the medical schools at that time were proprietary institutions operating for financial returns rather than the improvement of the medical curriculum. Beginning in 1915, the percentage of failures began to drop, reaching a low of 5.7 in 1930. Beginning in 1936, the percentage of failures began to rise, reaching another peak of 20.7 in 1940. This was the result of the increase in the number of foreign-trained physicians seeking licensure in the United States, many of whom are not successful after repeated attempts at licensure examinations. While the percentage of failures has been reduced somewhat in recent years, it still reflects the unsuccessful attempts of foreign-trained physicians, graduates of unapproved medical schools, and schools of osteopathy to secure licenses. The annual failure rate among graduates of approved medical schools is about 4%. This table again refers to examinations given annually rather than to individuals examined. A candidate who fails more than once in a state in a given year is counted as one failure, but, should he again fail in a succeeding year, this fact is computed among the failures for that year. Likewise, a successful candidate securing a license in more than one state in a given year is counted in both states and likewise is counted if he passed examinations in later years. The figures in this table give only a fair approximation of the number of physicians added to the profession.

TABLE 13.—*Licentiates Representing Additions to the Medical Profession, 1935-1956*

Year	Examination	Reciprocity and Endorsement	Total
1935	5,099	411	5,510
1936	5,548	629	6,177
1937	5,812	612	6,424
1938	5,759	501	6,260
1939	5,584	460	6,044
1940	5,432	455	5,887
1941	5,241	474	5,715
1942	5,560	454	6,014
1943	5,586	372	5,958
1944	6,495	470	6,695
1945	4,979	769	5,748
1946	5,362	1,608	6,970
1947	5,273	1,617	6,890
1948	4,942	1,694	6,636
1949	4,260	1,616	5,876
1950	4,609	1,393	6,002
1951	4,985	1,288	6,273
1952	5,168	1,717	6,885
1953	5,388	1,888	7,276
1954	5,897	2,020	7,917
1955	6,211	1,526	7,737
1956	6,035	1,428	7,463
Totals	119,225	23,402	142,627

Graduates of Approved Schools and Others Registered, 1922-1956

In table 15, the numbers of physicians registered since 1922 are grouped in two categories, namely, graduates of approved medical schools and others. In the computation of these figures, schools rated in classes A and B prior to 1928 by the Council on Medical Education and Hospitals of the American Medical Association are included in the first grouping. In 1928, the classification of A, B, and C by the Council was discontinued, and a list of approved medical schools has since been maintained. In the columns headed "Others" are included graduates of foreign faculties of medicine, class C graduates, osteopaths given recognition by medical licensing boards, and graduates of schools not approved by the Council subsequent to 1928.

TABLE 14.—*Registration of Physicians, 1904-1956*

Year	Examined	Passed	Failed, %	Reciprocity or Endorsement	Total Registered
1904	7,056	5,693	19.3	1,005	6,698
1905	7,178	5,688	20.8	394	6,082
1906	8,040	6,373	20.7	1,502	7,875
1907	7,279	5,731	21.3	1,427	7,158
1908	7,775	6,089	21.7	1,284	7,373
1909	7,295	5,805	19.6	1,381	7,246
1910	7,011	5,719	18.4	1,640	7,359
1911	6,964	5,582	19.8	1,243	6,825
1912	6,880	5,467	20.5	1,273	6,740
1913	6,453	5,253	18.6	1,292	6,545
1914	5,579	4,379	21.5	1,439	5,818
1915	5,334	4,507	15.5	1,399	5,906
1916	4,878	4,151	14.9	1,353	5,504
1917	4,754	4,085	14.0	1,360	5,445
1918	3,667	3,184	13.2	1,047	4,231
1919	4,750	4,074	14.2	2,546	6,620
1920	4,796	4,062	15.3	2,558	6,620
1921	4,825	4,228	12.4	2,186	6,414
1922	4,081	3,539	12.2	2,073	5,612
1923	4,727	4,028	14.8	2,405	6,433
1924	5,392	4,756	11.8	1,923	6,679
1925	6,002	5,450	9.2	1,861	7,311
1926	5,770	5,314	7.9	1,955	7,269
1927	5,389	5,002	7.2	2,176	7,178
1928	5,458	5,090	6.7	2,228	7,318
1929	5,629	5,282	6.2	2,420	7,702
1930	5,571	5,255	5.7	2,366	7,621
1931	5,611	5,263	6.2	2,211	7,476
1932	5,675	5,247	7.6	1,886	7,133
1933	5,673	5,244	7.6	1,989	7,233
1934	6,145	5,628	8.4	2,161	7,789
1935	6,443	5,859	9.1	2,194	8,053
1936	6,918	6,224	10.0	2,773	8,997
1937	7,334	6,604	10.0	3,205	9,809
1938	7,461	6,589	11.7	2,956	9,545
1939	7,754	6,493	16.3	2,872	9,365
1940	7,926	6,291	20.7	2,866	9,157
1941	7 539	6,057	19.7	2,762	8,819
1942	7,223	6,120	15.4	2,469	8,589
1943	8,403	7,489	10.9	2,340	9,829
1944	6,817	6,011	11.8	2,596	8,607
1945	5,930	5,343	9.9	3,622	8,965
1946	7,610	6,856	9.9	9,669	16,525
1947	7,164	6,414	10.5	7,701	14,115
1948	6,624	5,904	10.8	7,595	13,499
1949	5,963	5,219	12.5	6,929	12,148
1950	6,203	5,481	11.6	6,755	12,236
1951	6,473	5,716	11.7	6,225	11,941
1952	7,028	6,229	11.3	7,016	13,245
1953	7,425	6,543	13.0	7,869	14,412
1954	8,066	7,033	12.7	8,202	15,235
1955	8,501	7,400	12.9	7,461	15,862
1956	8,342	7,179	13.9	7,421	14,600

In 1956 there were 14,600 candidates registered, of whom 13,146, or 90%, were graduates of approved schools and 1,454, or 10%, were in the second group. In the 35 years recorded in this table, 345,308 candidates were registered, including 311,416 (90.1%) graduates of medical schools indicated as in the approved group, and 33,892 (9.9%) others.

Graduates of Unapproved Medical Schools Registered, 1952-1956

Recorded in table 16 are data regarding graduates of institutions that have not been approved by the Council on Medical Education and Hospitals of the

American Medical Association. Figures are given for those licensed after written examination and those licensed by endorsement of credentials. The table also includes a column combining the figures for these two groups. They represent graduates of five unapproved medical schools, all but one of which are now extinct. The latter institution has obtained the status of an approved school. There were 216 graduates of unapproved medical schools registered from 1952 to 1956, inclusive, 80 by examination and 136 by endorsement of credentials. California, Florida, Massachusetts, New York, and Texas licensed the greatest number of graduates of unapproved medical schools.

TABLE 15.—*Graduates of Approved Schools and Others Registered, 1922-1956*

Year	Graduates Approved Schools		Others		
	No.	Percentage of Total	No.	Percentage of Total	Totals
1922	4,519	80.5	1,093	19.5	5,612
1923	5,196	80.8	1,237	19.2	6,433
1924	5,687	85.1	992	14.9	6,679
1925	6,314	86.4	997	13.6	7,311
1926	6,441	88.7	828	11.3	7,269
1927	6,410	89.4	768	10.6	7,178
1928	6,585	90.1	733	9.9	7,318
1929	7,003	91.0	699	9.0	7,702
1930	7,011	92.1	610	7.9	7,621
1931	6,932	92.8	544	7.2	7,476
1932	6,676	92.1	457	6.3	7,133
1933	6,774	93.7	459	6.3	7,233
1934	7,172	92.1	617	7.9	7,789
1935	7,360	91.3	693	8.5	8,053
1936	7,934	88.1	1,063	11.8	8,997
1937	8,391	85.5	1,418	14.4	9,809
1938	8,315	87.1	1,230	12.9	9,545
1939	8,067	86.2	1,298	13.8	9,365
1940	7,781	85.0	1,376	15.0	9,157
1941	7,770	87.9	1,049	11.9	8,819
1942	7,290	84.9	1,299	15.1	8,589
1943	8,640	87.9	1,189	12.2	9,829
1944	7,737	89.8	870	10.1	8,607
1945	8,233	91.8	732	8.1	8,965
1946	15,632	94.9	835	5.1	16,527
1947	13,097	93.0	1,018	7.0	14,115
1948	12,791	94.8	708	5.2	13,499
1949	11,378	93.7	770	6.3	12,148
1950	11,502	94.0	734	6.0	12,236
1951	11,027	92.3	914	7.7	11,941
1952	12,198	92.1	1,047	7.9	13,245
1953	13,189	91.5	1,223	8.5	14,412
1954	13,814	90.7	1,421	9.3	15,235
1955	13,344	89.8	1,517	10.2	14,861
1956	13,146	90.0	1,454	10.0	14,600
Totals	311,416	90.1	33,892	9.9	345,308

Twenty-seven boards were represented in the five year period. In 1956, there were 29 licensed by 10 boards, 9 by examination, and 20 by reciprocity or endorsement. As can be noted, the numbers licensed are steadily decreasing.

Graduates of Schools of Osteopathy Registered by Medical Examining Boards, 1952-1956

The number of graduates of schools of osteopathy granted the privilege of practicing medicine or surgery or both by 17 licensing boards from 1952 to 1956, inclusive, is given in table 17. There have been 1,296 such persons registered, 903 by examination and 393 without written examination. In 1956, 12 boards licensed osteopathic physicians to practice. Two boards admitted these graduates after examination and three by reciprocity, while seven boards licensed them after both methods. Following is a summary of the actions and regulations of the 17 boards providing for the licensing of osteopaths by the medical examining board.

In Colorado an osteopath receives a license to practice medicine. In Connecticut any registered osteopath may obtain the right to practice medicine or surgery, or both, according to the type of examination taken. Osteopaths in Delaware may be licensed as osteopathic physicians after successfully passing an examination in selected subjects. The District of Columbia will permit any person engaged in the practice of osteopathy on or before Jan. 1, 1928, to file application for a license to practice osteopathy and surgery. Since 1952, in Illinois, graduates of the Chicago College of Osteopathy are examined and may receive medical licenses. Under an amendment to the medical practice act in 1945, osteopaths in Indiana are permitted to practice medicine and surgery. Persons who were licensed in osteopathy before 1945 are authorized to practice osteopathy, surgery, and obstetrics.

In Massachusetts, for the purposes of registration, the D.O. degree is considered equivalent to the M.D. degree. In New Hampshire, under the provisions of the medical practice act, osteopaths are granted the right to practice medicine and surgery. The New Jersey medical practice act provides that an osteopath licensed prior to Nov. 1, 1941, who has served for a period of two years as an intern or resident surgeon in an approved osteopathic or medical hospital, or has completed a postgraduate course of two years in a college of osteopathy or medicine approved by the board, or has had at least three years of practice in a hospital approved by the board, can be admitted to an examination in pharmacology, therapeutics, and surgery. If successful, he can obtain a license to practice medicine and surgery.

In New York, a law approved April 10, 1946, provides that any osteopathic licentiate who had obtained the additional right to use instruments for minor surgical procedures and to use anesthetics, antiseptices, narcotics, and biological products, or any applicant who had met or would meet all the preliminary and professional requirements as of Sept. 1, 1936, and has satisfactorily passed or would pass the regular licensing examination would be granted the right to practice medicine without limitation.

The Ohio Medical Practice Act was amended in 1943 to provide that all graduates from osteopathic schools applying for the right to practice in the state must meet certain educational requirements and must pass certain examinations. One of the required examinations is in surgery. Those who qualify and pass all of the examination are then given a license to practice osteopathic medicine and surgery. Those in practice and licensed under a more limited law in effect prior to 1943 can secure a license to practice osteopathic medicine and surgery by meeting certain additional requirements, including postgraduate work and the passing of several additional examinations.

In Oregon, osteopaths who meet certain requirements are granted the right to practice in the subjects covered by the medical examination. In South Dakota, osteopaths may be licensed to practice medicine, surgery, and obstetrics. This is an unrestricted license. Texas issues only one license, which is unrestricted in scope. In Virginia osteopaths may obtain the right to use drugs and to perform surgery with instruments. state may apply to take the same examination as physicians. If successful, they will be granted licenses to practice medicine and surgery. In Wyoming, the statutes contain no specific provision for the licensing of osteopaths. The medical practice act provides that the certificate issued to all applicants shall be deemed a license to practice medicine in all branches in which the applicant has taken an examination.

TABLE 16.—*Graduates of Unapproved Medical Schools Registered, 1952-1956*

	Examination						Reciprocity and Endorsement						Combined Totals
	1952	1953	1954	1955	1956	Totals	1952	1953	1954	1955	1956	Totals	
Arizona	..	..	..	..	..	..	..	..	1	..	..	1	1
California	..	..	..	..	..	..	..	8	19	15	2	44	44
Connecticut	..	..	..	..	..	..	1	..	..	..	..	1	1
Delaware	..	..	..	..	..	..	..	..	..	1	..	1	1
District of Columbia	..	..	..	..	..	..	..	..	..	..	1	1	1
Florida	7	5	8	7	4	31	..	..	..	..	..	..	31
Georgia	..	1	2	..	..	3	1	1	..	..	..	2	5
Idaho	..	..	..	..	..	..	..	1	..	..	..	1	1
Illinois	..	..	..	..	..	..	..	..	2	4	..	6	6
Iowa	..	..	..	..	..	..	..	..	1	1	..	2	2
Maine	..	..	..	1	..	1	1	..	..	1	..	2	3
Massachusetts	5	2	5	1	..	13	..	..	..	..	..	..	13
Michigan	..	..	..	..	..	..	1	..	1	..	1	3	3
Missouri	..	..	..	..	..	..	1	2	1	..	1	5	5
Nevada	..	..	..	..	..	..	2	..	..	..	..	2	2
New Hampshire	..	..	..	..	..	..	..	..	..	..	1	1	1
New Jersey	..	3	1	..	..	4	..	..	..	..	4	4	8
New York	1	3	3	1	5	13	1	..	..	..	1	2	15
Ohio	..	..	..	3	..	3	..	1	3	..	..	4	7
South Dakota	..	..	..	1	..	1	..	..	..	..	..	..	1
Pennsylvania	2	..	..	..	..	2	1	1	..	1	..	3	5
Tennessee	..	..	..	..	..	..	..	1	..	..	..	1	1
Texas	..	..	..	..	..	..	18	9	7	3	8	45	45
Virginia	..	2	..	..	..	2	..	..	..	..	..	..	2
West Virginia	1	3	..	..	..	4	..	..	..	..	..	..	4
Wisconsin	..	..	..	..	..	..	2	..	..	1	1	4	4
Territories and possessions	..	1	2	..	..	3	..	..	1	..	..	1	4
Totals	16	20	21	14	9	80	29	24	36	27	20	136	216

TABLE 17.—*Graduates of Schools of Osteopathy Registered by Medical Boards, 1952-1956*

	Examination						Reciprocity and Endorsement						Combined Totals
	1952	1953	1954	1955	1956	Totals	1952	1953	1954	1955	1956	Totals	
Colorado	5	8	3	7	1	24	3	15	22	16	12	68	92
Connecticut	1	2	3	..	..	6	..	..	..	..	..	..	6
Delaware	..	1	..	2	3	6	2	4	1	2	..	9	15
District of Columbia	..	..	..	..	..	..	..	..	1	1	..	2	2
Illinois	..	..	..	14	10	24	..	..	..	..	11	11	35
Indiana	7	5	2	6	2	22	9	10	11	9	..	39	61
Massachusetts	..	..	1	..	..	1	6	1	2	5	4	18	19
New Hampshire	..	..	..	..	..	..	1	3	1	3	1	9	9
New Jersey	11	11	7	8	6	43	15	10	18	7	28	78	121
New York	36	47	44	92	42	261	5	4	1	1	4	15	276
Ohio	47	64	81	73	63	328	7	20	13	2	13	55	383
Oregon	..	..	..	..	..	..	1	1	..	..	2	4	4
South Dakota	..	..	1	..	..	1	..	..	..	..	..	..	1
Texas	41	32	46	25	9	153	21	16	13	10	13	73	226
Virginia	..	..	..	..	..	..	1	1	1	..	..	3	3
Wisconsin	8	7	7	6	6	34	2	..	1	1	3	7	41
Wyoming	..	..	..	..	..	..	1	..	..	1	..	2	2
Totals	156	177	195	233	142	903	74	85	85	58	91	393	1296

The Wisconsin law, amended in 1950, provides that an osteopath licensed in the state may obtain a license to practice medicine and surgery by completing a refresher course in materia medica and pharmacology consisting of not less than 64 hours of lecture and 60 hours of laboratory work and by passing an examination in these subjects. Osteopaths not licensed in the

Preprofessional Training Requirements of Licensing Boards

In order to provide an opportunity for medical students to gain a broad educational background, the Council on Medical Education and Hospitals of the American Medical Association recommends four years of preprofessional college training. Since January, 1953, the minimum requirement for admission to an

approved medical school has been three years of college work, with the provision that rarely and only under exceptional circumstances will an approved medical school be justified in admitting a superior student with only two years of college preparatory work.

TABLE 18.—*Professional Educational Requirements of Medical Licensing Boards*

	Length of Medical School Academic Year				Total Time Spent in Medical School, Registration to Graduation			
	Weeks	Months	Same as A.A.M.C. & C.M.E.&H.*	Not Specified By Board	Weeks Annual	Months Annual	Years	Same as A.A.M.C. & C.M.E.&H.*
Alabama	..	9	..	..	..	..	4	..
Arizona	..	..	x	..	..	..	..	x
Arkansas	..	9	..	..	..	..	4	..
California	..	9	..	..	..	..	4	..
Colorado	..	..	..	x	..	..	4	..
Connecticut	39	..	..	..	..	..	4	..
Delaware	..	..	..	x	..	..	4	..
District of Columbia	..	9	..	..	..	36	4	..
Florida	..	..	x	..	..	..	..	x
Georgia	..	9	..	..	..	..	4	..
Idaho	..	..	..	x	..	..	4	..
Illinois	..	9	..	..	..	40	4	..
Indiana	..	8	..	..	..	42	..	..
Iowa	..	..	..	x	..	..	4	..
Kansas	..	9	..	..	..	..	4	..
Kentucky	..	9	..	..	..	..	4	..
Louisiana	..	.	x	..	..	..	4	x
Maine	36	.	..	..	..	..	4	..
Maryland	..	..	x	..	..	..	4	x
Massachusetts	..	9	..	..	..	..	4	..
Michigan	32	..	..	..	..	36	..	..
Minnesota	36	..	..	..	..	..	4	..
Mississippi	32	..	..	..	..	..	4	..
Missouri	32	..	..	..	..	..	4	..
Montana	..	9	..	..	..	..	4	..
Nebraska	..	8	..	..	..	..	4	..
Nevada	..	9	..	..	..	..	4	..
New Hampshire	..	9	..	..	..	..	4	..
New Jersey	.	8	..	..	..	..	4	..
New Mexico	..	.	..	x	..	..	..	x
New York	..	8	..	..	..	..	..	..
North Carolina	..	..	..	x	..	..	4	..
North Dakota	..	8	..	..	..	..	4	..
Ohio	..	9	..	..	..	..	4	..
Oklahoma	.	..	..	x	..	..	..	..
Oregon	..	8	..	.	..	32	..	..
Pennsylvania	32	..	..	..	..	..	4	..
Rhode Island	..	..	.	x	..	..	..	..
South Carolina	..	..	x	..	..	..	..	x
South Dakota	..	..	..	x	..	..	..	x
Tennessee	36	..	..	..	..	..	4	..
Texas	..	8	..	..	..	..	4	..
Utah	..	9	..	..	..	..	4	..
Vermont†	..	..	..	..	..	..	4	..
Virginia	..	8	..	..	.	..	4	..
Washington	..	..	x	..	..	..	4	x
West Virginia	..	..	..	x	..	..	4	..
Wisconsin	..	..	x	..	..	..	4	x
Wyoming	..	..	x	..	..	..	4	..
Alaska	..	..	x	..	..	..	..	x
Canal Zone	..	9	..	..	..	..	4	..
Guam	..	9	..	..	..	..	4	..
Hawaii	..	..	..	x	..	..	..	x
Puerto Rico	..	10	..	..	..	..	4	..
Virgin Islands	..	..	..	x	..	..	4	..

* Association of American Medical Colleges and Council on Medical Education and Hospitals of the American Medical Association.
x Implies yes.
† 900 hours.

The preprofessional requirements of medical licensing boards are indicated in table 18. Seven boards specify that no preprofessional requirement is mentioned in the medical practice act. Twelve boards reported a three-year requirement. In others, the law specifies at least two years of college work. No board specifies in detail the number of hours that must be devoted to the subjects of the premedical curriculum, although seven boards report that this training must include certain subjects, such as English, physics, chemistry, biology, and a foreign language. The candidates appearing for medical licensure are graduates of all years, and the seeming lack of conformity with accepted standards as promulgated by the Council on Medical Education and Hospitals of the American Medical Association and the Association of American Medical Colleges is due to the fact that initiation of the three-year minimum requirement for all candidates appearing for licensure would eliminate many graduates of earlier years. In practice, the boards in granting licensure to a graduate of an approved medical school accept the premedical training required in the year the candidate was admitted to medical school.

Professional Educational Requirements of Licensing Boards

The medical practice acts or board regulations of several state medical licensing boards specify the length of the medical school course. In other states, the law or ruling specifies that the professional educational requirements included in the standards for approval of the Council on Medical Education and Hospitals of the American Medical Association or for membership in the Association of American Medical Colleges, or both, is the regulation for licensure. Table 19 outlines the requirement of each licensing board. The table does not record the internship that is a requirement for licensure in some states.

TABLE 19.—*Requirements of Premedical Training by Medical Licensing Boards*

Two Years or More of College		
Alabama[1]	Massachusetts[7]	Rhode Island
Arizona[2]	Michigan[6]	South Carolina[6]
Arkansas	Minnesota	South Dakota[6]
California[3]	Mississippi	Tennessee
Colorado[1]	Missouri	Texas
Connecticut[4]	Montana	Utah[6]
Delaware[5]	Nebraska	Vermont[6]
Florida[6]	Nevada[6]	Virginia
Georgia	New Hampshire	Washington[1]
Idaho	New Jersey[5]	West Virginia
Illinois	New Mexico[1]	Wisconsin[6]
Indiana[7]	New York[8]	Wyoming[1]
Iowa[1]	North Carolina[6]	Alaska[5]
Kansas	North Dakota	Canal Zone
Kentucky	Ohio	Guam
Louisiana[6]	Oklahoma[1]	Hawaii
Maine	Oregon	Puerto Rico
Maryland[3]	Pennsylvania	Virgin Islands[6]

1. Not specified by law.
2. Entrance requirement prescribed by accrediting agencies.
3. Three years for applicants matriculating after Jan. 1, 1954.
4. One year prior to 1919, two years subsequent to 1947 including courses in physics, chemistry, and biology.
5. Premedical training must include courses in physics, chemistry, biology, English and a foreign language.
6. Three-year college requirement.
7. For all applicants courses in physics, chemistry, and biology must be included in premedical training.
8. Premedical training must include courses in English, physics, chemistry, and biology.

Approval of Medical Schools

Seven licensing boards maintain their own list of approved medical schools in the United States and Canada. Twenty boards require applicants for licen-

sure from medical schools in the United States and Canada to be graduates of medical schools approved by the Council on Medical Education and Hospitals of the American Medical Association. One board requires that the medical school be a member of the Association of American Medical Colleges. Twenty-six boards require that the schools be approved by the Council and be members of the Association of American Medical Colleges. In the majority of instances the requirement is specified in the medical practice act or a formal regulation of the board. In actuality, all approved medical schools are both approved by the Council and members of the Association of American Medical Colleges.

Required Internships

There is currently no medical school in the United States which requires that the student serve an internship as a prerequisite to graduation. Duke University School of Medicine specifies the internship requirement but does not withhold the degree until the internship is completed. The degree is issued at the end of the four-year medical course, but the school obtains from each student a signed agreement that he will spend two years in training in a hospital or laboratory before entering practice.

TABLE 20.—*Medical Licensing Boards Requiring a One-Year Internship**

Alabama	Michigan†	Utah
Arizona	Nevada	Vermont
California	New Hampshire	Washington†
Colorado	New Jersey**	West Virginia
Delaware†	North Dakota	Wisconsin
District of Columbia	Oklahoma	Wyoming†
Idaho	Oregon	Alaska‡
Illinois†	Pennsylvania†	Canal Zone
Iowa	Rhode Island†	Hawaii
Kentucky	South Carolina	Puerto Rico†
Maine	South Dakota	Virgin Islands†

* Some states require the internship for graduates of medical faculties abroad and from reciprocity or endorsement applicants.
† Internship must be a rotating service.
** One-year rotating service or two years of straight internship or two-year residency in a specialty.
‡ Unless in active practice for four years.

One year of internship, as a prerequisite to licensure, is required by the licensing boards of 27 states, the District of Columbia, Alaska, Canal Zone, Hawaii, Puerto Rico, and the Virgin Islands. South Carolina reported the institution of this requirement in the past year. Nine boards specify that the internship must be a rotating service. Oklahoma, Vermont, and Hawaii reported that a one-year general rotating internship or two years of straight internship or two year residency in a specialty will meet the board's internship requirement. Alaska will accept active practice for four years in lieu of the internship requirement. Those licensing boards that require an internship for licensure are listed in table 20.

Temporary and Educational Permits, Limited and Temporary Licenses, or Other Certificates Issued by State Licensing Boards

Thirty-three boards provide for the issuance of temporary and educational permits, limited and temporary licenses, or other certificates. The terms for the issuance of such certificates vary. This limited registration may apply to hospital training, to those ineligible for licensure who seek further educational training, or for regular practice until the next regular session of the licensing board. A list of these states and information on the length of validity of this special registration are shown in table 21.

TABLE 21.—*Temporary and Educational Permits, Limited and Temporary Licenses, or Other Certificates Issued by State Licensing Boards*

Arizona	Temporary permits issued on basis of community emergency and subject to qualifying for regular license. A regular license limited to full-time practice in federal and state hospitals or institutions, or federal, state, county or municipal public health departments, exempt only in basic science certification, is also issued.
Arkansas	Temporary permit until regular board meeting.
Connecticut	Educational permit issued for extension of education of graduates of unapproved foreign medical schools.
Delaware	Temporary emergency license upon proven emergency, one year, subject to renewal.
Georgia	Permit until board meets. Institutional permits for one year.
Idaho	To candidates holding certificate of National Board of Medical Examiners or licensed by written examination in another state until next meeting of board.
Illinois	Temporary certificates for residency training for applicants who are not qualified for permanent registration.
Indiana	Temporary license pending next examination for graduates of approved medical schools. Temporary reciprocal license for six months.
Iowa	Resident license valid in hospital approved by board for one year, and may be renewed for additional three years.
Kansas	Temporary permit until next board meeting. Fellowships restricted to state institutions and state hospitals. Doctor holding fellowship works under direction of the head of the institution.
Kentucky	Temporary permits issued to applicants by endorsement and serve until investigations completed and meeting of board. Limited licenses are for special place, purpose, and time.
Louisiana	Temporary permit is granted to physicians possessing the necessary credentials who file application for examination or reciprocity and who locate in Louisiana in between the regular semiannual examination meetings of the board. Temporary permit valid until next meeting of the board.
Maine	Temporary licenses granted for residency training for one year and to camp physicians for ten weeks.
Michigan	Temporary license for training program.
Mississippi	Temporary permit for practice until next board meeting.
Nevada	Temporary permit for one year for residency training within a specific hospital in Nevada.
New Hampshire	Temporary license for five years to foreign physicians. Permanent license issued upon becoming citizen of the United States.
New Jersey	Temporary license for noncitizens. Permanent license in six years; may be extended an additional two years.
New Mexico	Temporary permit for practice until next board meeting. Special permit confined to institutional practice.
New York	Temporary certificate for residency training for those eligible for examination in hospitals other than state and municipal institutions.
North Carolina	Limited license issued for duration of residency.
North Dakota	Temporary permit until next board examination.
Oklahoma	Temporary licenses for residency training in approved hospitals.
Pennsylvania	Postgraduate certificate issued for residency training.
South Dakota	Temporary license issued for graduates of foreign Medical schools.
Texas	Temporary permit issued until next board meeting.
Virginia	Temporary permit issued until next board meeting and for service as a hospital resident.
West Virginia	Temporary permits issued until next board meeting to qualified applicants, and for practice within specified area until physician has an opportunity to appear before the board regarding permanent licensure.
Wisconsin	Temporary permit for graduates of foreign medical schools not recognized by board for licensure.
Alaska	Temporary permits issued while processing permanent licensure, to summer cannery physicians and to physicians in the armed forces on short tours of duty, valid for six months, renewable an additional six months.
Guam	Restrictive certificate to permit medical employees of federal contractors to practice in the discharge of their official duties.
Puerto Rico	Provisional license to foreign graduates for one year. Permit ceases on June 30, 1957.
Virgin Islands	Temporary certificates issued to military service personnel on duty and to municipal personnel until next license examination.

Licensure Requirements for Interns and Residents in Hospitals

In general, physicians serving internships are not required to be licensed in the state in which the hospital where they are interning is located. Wyoming and Puerto Rico have such a requirement. New Jersey permits a service of two years without licensure and Florida a three-year service before licensure. Other states have a requirement of registration with the licensing board or a stipulation that the physician must be eligible for licensure. The states which require some form of registration for interns are listed in table 22.

TABLE 22.—*Licensure, Registration, or Other Requirements for Interns*

Licensure	Other Requirements
Wyoming	Colorado[1]
Puerto Rico	Florida[2]
	Indiana
	Massachusetts[3]
	New Jersey[4]
	New Mexico[5]
	South Carolina[6]
	Texas[5]
	Virginia[7]
	West Virginia[7]

1. Registration with licensing board required annually not to exceed four years.
2. Must register every six months with state board of health and may serve for three years without licensure.
3. Limited registration for one year, renewable annually for a period not to exceed five years.
4. May serve for two years without licensure.
5. Registration with licensing board required.
6. Must be eligible for licensure.
7. Graduates of foreign medical schools required to obtain permission from licensing board.

TABLE 23.—*Licensure, Registration, or Other Requirements for Residents*

Licensure or Temporary Registration Required	Other Requirements
Arkansas	Colorado[2]
California[1]	Delaware[4]
Connecticut[3]	District of Columbia[5]
Idaho	Florida[6]
Illinois[7]	New Jersey[13]
Indiana	Virginia[18]
Iowa[8]	West Virginia[18]
Louisiana	
Maine[9]	
Massachusetts[10]	
Michigan[11]	
Minnesota	
Mississippi	
Nevada[12]	
New York[14]	
North Carolina[15]	
Ohio[16]	
Oklahoma[11]	
Pennsylvania[17]	
South Carolina	
South Dakota	
Texas	
Virginia[19]	
Wisconsin	
Wyoming	
Puerto Rico	

1. May serve one year without licensure.
2. Four years without licensure. Required to register with board.
3. May be required by hospitals.
4. Registration with licensing board required.
5. Hospital must notify licensing board.
6. Three years without licensure. Hospital required to register resident every six months.
7. Limited license for employment as residents in hospitals maintained by state. Temporary certificate for residency or specialty training for noncitizens in approved hospitals in United States.
8. Resident's license issued for one year and may be renewed for an additional three years.
9. Temporary license granted for one year.
10. Limited registration granted.
11. Temporary license.
12. Temporary permit for one year.
13. May serve two years without licensure.
14. Temporary certificates for residents in approved hospitals to those eligible for licensure in hospitals other than state and municipal institutions.
15. Limited license issued.
16. If unlicensed must work under supervision and not permitted to prescribe narcotics, sign legal documents, or perform major surgery.
17. Postgraduate certificate issued for residency training.
18. Graduates of foreign medical schools required to obtain permission from licensing board.
19. Temporary permit for service as a resident. Graduates of foreign medical schools required to obtain permission from licensing board.

TABLE 24.—*Schedule of Written Examination Dates and Issuance of Licenses by Reciprocity or Endorsement of Credentials*

	Written Examinations Held	Licenses by Reciprocity or Endorsement Issued
Alabama	Annually	Continuously
Arizona	Quarterly	Quarterly
Arkansas	Twice annually	Twice annually
California	Quarterly	Continuously
Colorado	Twice annually	January, April, July, and October
Connecticut	March, July, and November	Continuously
Delaware	Semiannually	Semiannually
District of Columbia	Twice annually	Quarterly
Florida	Twice annually	No reciprocity
Georgia	June and October	June and October
Idaho	Twice annually	Twice annually
Illinois	Quarterly	Quarterly
Indiana	Annually, June	Approximately eight times annually
Iowa	Twice annually	Once monthly
Kansas	June and December	June and December
Kentucky	Semiannually	Every two months
Louisiana	June and December	June and December
Maine	March, July, and November	March, July, and November
Maryland	Twice annually	Monthly
Massachusetts	January and July	Once a month
Michigan	June and October	Continuously
Minnesota	January, April, June, and October	February, May, July, and November
Mississippi	Annually in June	Twice annually
Missouri	Three annually	Six to eight times annually
Montana	Semiannually	Semiannually
Nebraska	Annually	Continuously
Nevada	Quarterly	Quarterly
New Hampshire	Twice annually	Twice annually
New Jersey	June and October	Monthly except August
New Mexico	Twice annually	Twice annually
New York	June and December	Continuously
North Carolina	Annually	Five times annually
North Dakota	January and July	January and July
Ohio	June and December	January, April, June, July, October, and December
Oklahoma	Annually	Quarterly
Oregon	January and July	Quarterly
Pennsylvania	January and July	Monthly
Rhode Island	Quarterly	Four to eight times annually
South Carolina	Twice annually	Five times annually
South Dakota	Twice annually	Continuously
Tennessee	Quarterly	Continuously
Texas	Twice annually	Quarterly
Utah	Once annually	February, June, August, and November
Vermont	Twice annually	Continuously
Virginia	Twice annually	Twice annually
Washington	Twice annually	Twice annually
West Virginia	January and July	Quarterly
Wisconsin	Twice annually	Quarterly
Wyoming	Three annually	Three annually
Alaska	On application	On application
Canal Zone	On application	On application
Guam	On application	On application
Hawaii	January and July	Continuously
Puerto Rico	Twice annually	Continuously
Virgin Islands	Twice annually	Twice annually

Thirty-three boards require that physicians serving as interns in hospitals must be licensed or registered in the state. Twenty-six boards stipulate that registration must be in the form of a regular license or a

temporary certificate for the term of the residency. Seven boards do not require licensure but stipulate some form of registration with the licensing board. The regulations of each of the licensing boards that exact some requirement of those engaged in residency training are given in table 23.

TABLE 25.—*Medical Licensure Fees*

	Examination	Reciprocity or Endorsement
Alabama	$ 10	$ 50
Arizona	25	100
Arkansas	50	100
California	25	100
Colorado	25	50
Connecticut	35	75[a]
Delaware	25	100
District of Columbia	25	50[b]
Florida	50	...
Georgia	20	50
Idaho	25	100
Illinois	15	25
Indiana	25	100
Iowa	25	50
Kansas	35	50
Kentucky	50	75
Louisiana	25	50
Maine	27	52
Maryland	35	50
Massachusetts	25	50
Michigan	50	100
Minnesota	25	100
Mississippi	10	50
Missouri	25	100
Montana	50	75
Nebraska	25	50
Nevada	100	200
New Hampshire	30	50
New Jersey	50	100
New Mexico	50	50
New York	40	40
North Carolina	50	100
North Dakota	25	50
Ohio	25	50
Oklahoma	25	100
Oregon	25	100
Pennsylvania	25	50
Rhode Island	20	20
South Carolina	25	100
South Dakota	20	50
Tennessee	35	50[c]
Texas	50	100
Utah	25	50
Vermont	20	50
Virginia	25	100
Washington	25	25
West Virginia	25	100
Wisconsin	50	100
Wyoming	25	50
Alaska	25	100
Canal Zone	10	5
Guam	50	50
Hawaii	25	25
Puerto Rico	30	30
Virgin Islands	65	...

a. Endorsement of certificate of National Board of Medical Examiners, $35.

b. Endorsement of certificate of National Board of Medical Examiners, $25.

c. Endorsement of certificate of National Board of Medical Examiners, $10.

Schedule of Written Examination Dates and Reciprocity Meetings

The schedule of dates for written examination and meetings or oral examination for the issuance of licenses by reciprocity or by endorsement of credentials is given in table 24. In most instances written examinations are scheduled twice annually and reciprocity meetings quarterly or as soon as the application for licensure can be processed. In those states requiring a basic science certificate for licensure, dates of the examination or reciprocity meetings are arranged to coincide closely with the examination and meeting dates of the boards of examiners in the basic sciences. A few states issue temporary permits enabling physicians to begin the practice of medicine until the board examination or meeting is held.

Medical License Fees

Table 25 lists for each state, territory, and outlying possession the fee charged by the medical licensing board for registration by examination and also by reciprocity or endorsement of credentials. The examination fee tends to be uniform, the majority of the boards charging a fee of $25. The fee for a license without examination varies from $20 to $200. Three states have a lower fee for those being certified on the basis of the certificate of the National Board of Medical Examiners than candidates licensed by endorsement of state licenses.

TABLE 26.—*States Requiring Annual Registration*

State	Fee	State	Fee	State	Fee
Arizona	$ 5	Minnesota	$ 3	Tennessee	5
Arkansas	a	Missouri*	5	Texas	5
California	1	Montana	5	Utah	3
Colorado	b	Nebraska	2	Vermont	2
Connecticut	2	Nevada	5	Virginia	1
Dist. of Columbia	4	New Mexico	e	Washington	7
Florida	1c	New York*	6	West Virginia*	2
Georgia	3	North Dakota	f	Wisconsin	3
Idaho	10	Oklahoma	3	Wyoming	2
Indiana	d	Oregon	g	Alaska	10
Iowa	3	Pennsylvania	1	Guam	None
Kansas	3	Rhode Island	1	Hawaii	2
Louisiana	10	South Dakota	2	Virgin Islands	50

* Biennial registration.

a. Residents $2, nonresidents $4.
b. Residents $2, nonresidents $10.
c. Required by State Board of Health.
d. Residents $5, nonresidents $10.
e. Residents $2, nonresidents $5.
f. Residents $5, nonresidents $2.
g. Residents $15, nonresidents $5.

Licensure on Government Credentials

Few states have provision in their medical practice acts for the acceptance of credentials issued by the federal government as a basis for licensure without examination. Ten boards—Alabama, California, Delaware, Illinois, Pennsylvania, Texas, Utah, Vermont, Virginia, and Wisconsin—have indicated that in their discretion they may accept such credentials under varying regulations.

Annual Registration

Thirty-nine boards require physicians to register their licenses annually or biennially. This requirement applies in some states whether or not the physician is engaged in practice in the state. In table 26 are listed the licensing boards that exact this requirement and the fee charged for such registration. The fee charged

TABLE 27.—STATUS OF REQUIREMENTS FOR MEDICAL LICENSURE FOR PHYSICIANS TRAINED IN FOREIGN COUNTRIES OTHER THAN CANADA*

	Written Examination Required	Admitted Also on Reciprocal Basis	Citizenship	Basic Science Certificate	Internship in United States	Recognition Limited to Graduates of Schools Accepted by A.M.A. and A.A.M.C.	Additional Requirements	Exemptions	Examination Fee, Dollars
Alabama	x	..	x	..	x	..	x	..	10
Arizona	x	..	1st P	x	x	x	..	x	25
Arkansas	Not accepted								
California	x	..	x	..	x	..	x	x	25
Colorado	x	..	x	x	x	x	x	..	25
Connecticut	x	..	1st P	x	..	..	..	..	35
Delaware	x	..	x	..	x	x	x	..	25
Dist. of Columbia	x	x	..	x	x	x	..	x	25
Florida	x	..	x	x	..	x	..	..	50
Georgia	x	x	x	..	..	x	..	..	20
Idaho	Not accepted								
Illinois	x	x	1st P	..	x	..	x	..	15
Indiana	x	..	..	..	..	..	x	..	25
Iowa	x	..	1st P	x	x	x	x	..	25
Kansas	x	x	x	..	x	..	..	x	35
Kentucky	x	..	x	..	x	..	x	..	50
Louisiana	Not accepted								
Maine	x	..	x	..	x	..	..	..	27
Maryland	x	..	1st P	..	x	..	..	x	25
Massachusetts	x	..	1st P	..	..	..	..	x	25
Michigan	x	..	x	x	x	..	x	..	50
Minnesota	x	..	1st P	x	x	x	x	..	25
Mississippi	x	..	x	..	..	x	..	..	10
Missouri	x	..	x	..	x	..	..	..	25
Montana	Not accepted								
Nebraska	x	..	x	x	..	x	..	..	25
Nevada	Not accepted								
New Hampshire	x	x	x	..	x	..	..	x	30
New Jersey	x	x	x	..	x	..	x	x	50
New Mexico	x	..	1st P	x	..	x	..	..	50
New York	x	..	1st P	..	..	..	x	..	40
North Carolina	x	..	x	..	..	x	..	x	50
North Dakota	x	..	1st P	..	x	..	..	x	25
Ohio	x	..	x	..	..	..	..	x	25
Oklahoma	x	..	..	x	x	x	..	..	25
Oregon	Not accepted								
Pennsylvania	x	..	1st P	..	x	x	..	x	25
Rhode Island	x	x	1st P	x	x	..	x	x	30
South Carolina	Not accepted								
South Dakota	x	..	1st P	x	x	..	x	..	50
Tennessee	x	..	x	x	..	x	..	..	25
Texas	x	..	..	x	..	..	..	..	50
Utah	Not accepted								
Vermont	Not accepted								
Virginia	x	..	..	..	x	..	x	x	25
Washington	x	..	..	x	..	x	..	..	25
West Virginia	x	..	x	..	x	..	x	..	25
Wisconsin	x	x	1st P	x	x	x	x	..	50
Wyoming	Not accepted								
Alaska	x	x	x	x	..	x	..	..	25
Canal Zone	Not accepted								
Guam	x	x	..	..	x	x	..	..	50
Hawaii	x	..	1st P	..	x	x	..	x	25
Puerto Rico	Not accepted								
Virgin Islands	x	..	..	..	x	x	x	..	65

This summary should be supplemented by direct communication with the secretary of the licensing board of the state in which the physician is interested.

x Implies yes.

* Graduates of medical schools of Canada considered for licensure on the same basis as graduates of approved medical schools in the United States provided they comply with regulations pertaining to citizenship and internship.

Additional Requirements

Alabama. Candidate is eligible if he is certified by the National Board of Medical Examiners and approved.

California. Two-year internship in an approved hospital in the United States, one of said years being in California. The foreign graduate must also pass the regular written examination given by the board prior to being eligible to intern in an approved hospital in California and pass an oral and clinical examination before a certificate may be issued.

Colorado. Accepted on basis of written examination only. Credentials must be submitted in original form and accompanied by translation and will be directly verified or documents should bear evidence of being visaed by the U. S. Consul in the country wherein the school of graduation is or was located.

Delaware. Residence for one year required. Completion of senior year in approved medical school in the United States.

Illinois. Approved rotating internship in United States required. Limited license issued for practice in hospitals maintained by the state.

Indiana. Graduation from medical school approved by Indiana board, plus repetition of senior year in approved medical school in United States or two years' post graduate work in approved hospital in the United States. Postgraduate work must be obtained in states other than Indiana.

Iowa. Internship or one year in medical school in the United States.

Kentucky. Applicant required to complete at least five years' training in the United States in an institution approved by the board and to have successfully passed examination of National Board of Medical Examiners.

Exemptions

District of Columbia. Considered for reciprocal or endorsement registration on an individual basis.

Illinois. Graduates of European medical colleges or universities after Jan. 1, 1943, with the exception of certain approved colleges in the British Isles, Denmark, Holland, Norway, Sweden, and Switzerland, will not be accepted after July 1, 1954. However, graduates of such European medical colleges after Jan. 1, 1943, may be considered providing they present diplomas of graduation from approved medical colleges in the United States after attendance in such colleges for at least one year, and, in addition, have served rotating internship of one year in an approved hospital in Illinois.

Kansas. Applicant must be licensed to practice in country of graduation. Application must be filed one year in advance.

Maryland. Graduates of recommended medical schools may be accepted after completion of one year of internship or residency in an approved hospital in the United States if their credentials have been approved and they have presented at least two letters from medical authorities in the hospital recommending them as to their professional ability and moral character.

Graduates, not on the recommended list, who obtained the medical degree after Jan. 1, 1940, are not eligible; must serve three years in hospitals in United States and submit recommendations from the hospitals.

Graduates of foreign medical schools, before Jan. 1, 1940, whose schools were known to have had acceptable standards at the time of graduation may be considered if credentials and professional experience in the United States are acceptable to the board. Ability to write and speak English clearly is a primary requisite.

Massachusetts. Graduates of foreign medical schools who matriculated in medical school prior to Jan. 1, 1941, are eligible to apply for admission to the examinations. Graduates of unapproved foreign medical schools, who matriculated in medical school on or after Jan. 1, 1941, may apply to a Committee to review their qualifications.

New Hampshire. Diplomates of National Board of Medical Examiners eligible on reciprocity basis. Temporary license valid until citizenship is completed may be given. Considered on an individual basis.

Michigan. Completion of senior year in approved medical school in the United States or Canada, or M.S. degree in any field allied with medicine from a graduate school affiliated with an approved medical school, or, in lieu of above, certificate of an oral comprehensive examination in the basic sciences and clinical medicine by a joint screening board of examiners, from the faculties of the medical schools of the University of Michigan and Wayne University.

Minnesota. Two-year internship in Minnesota required. Credentials must be submitted in original form and accompanied by notarized photostatic copies translated and will be verified, and documents should bear evidence of being visaed by the U. S. Consul in the country wherein the school is located.

New Jersey. Original certificate covering medical courses, original diploma and license in foreign country with translation by the Lawyers' and Merchants' Translation Bureau, 11 Broadway, New York City.

North Dakota. Applicant must take examination at University of North Dakota in conversational English and the basic medical sciences as required of second year medical students. Temporary license issued which becomes permanent after six years of practice and after obtaining American citizenship.

Rhode Island. Must pursue postgraduate study or serve additional one year internship or residency. After Jan. 14, 1955, must serve approved rotating internship in Rhode Island. Applicant must be licensed to practice medicine and surgery in country in which school of graduation is located.

South Dakota. Applicant required to practice in an emergency area for four years under a temporary license and reappear before the board for permanent licensure. After July 1, 1955, only those cleared through IRO will be eligible.

Vermont. Must be diplomate of National Board of Medical Examiners.

Virginia. Applicant must be licensed to practice medicine and surgery in country in which school of graduation is located, or must have completed the course of study and passed examinations equivalent to those required for a diploma or license conferring such full right to practice.

New Jersey. Internship completed in foreign countries after July 1, 1934, not acceptable. Acceptance limited to schools recognized by the board. Considered on an individual basis. After Jan. 1, 1955 must have minimum of three years' training in a hospital approved by the board.

New York. Considered on an individual basis.

North Carolina. Considered on an individual basis.

Ohio. Graduates of schools of Continental Europe after 1943 are eligible if on accepted list. If not licensed in a foreign country must have one year in hospital in the United States; if not on accepted list, two years of training in an approved hospital in the United States. Considered on an individual basis.

Pennsylvania. Medical schools in China and Japan not acceptable.

Rhode Island. Matriculants in foreign medical faculties subsequent to Jan. 1, 1949, not acceptable unless applicant was a legal resident of Rhode Island at the time of matriculation at a foreign medical school and obtained his preprofessional training in the United States or Canada.

Texas. European graduates after 1939 limited to English speaking schools.

Virginia. Graduates of medical schools on accepted list admitted on same basis as approved medical schools in the United States and Canada. Graduates of other foreign schools having the required length of study and diploma required for practice in the country of their graduation, two years of internship in approved hospital in the United States or Canada within the past five years prior to application, or one year of study in an approved medical school in lieu of one year of the internship may be considered for examination. Noncitizens must sign declaration of intention to become a citizen.

Hawaii. Diplomates of National Board eligible on reciprocity basis.

West Virginia. Applicant must be resident of the state for three years preceding an application and be recommended by local medical society.

Wisconsin. 1953 Legislature established One Year Temporary Educational Permit, which authorizes graduates of unapproved foreign schools to obtain residency training in approved hospitals. May be renewed for two additional years.

Virgin Islands. Residence of six months required.

ranges from $1 to $10. Six states have a nonresident fee. Guam does not charge a fee. In Florida physicians are required to register with the state board of health, while Missouri, New York, and West Virginia require biennial registration.

Educational Council for Foreign Medical Graduates

When the program proposed by the Cooperating Committee on Graduates of Foreign Medical Schools was approved last year [2] by the organizations concerned, it was hoped that needed financing and staff would be obtained promptly so the program could be implemented at the earliest possible date. Unfortunately, unforeseen difficulties were encountered in procuring a tentative declaration of tax exemption under the proper section of the Bureau of Internal Revenue's code. These difficulties have been overcome just recently.

The Educational Council has made formal application to one of the large philanthropic foundations for funds to match the generous commitment previously made by the Kellogg Foundation. The new application was approved just as this material was going to press. The administrative staff for the Educational Council now will be recruited promptly and detailed, with final planning being undertaken with anticipation that the program will become effective by late 1957 or early 1958.

The board of the Educational Council has vigorously pursued its duties under the leadership of Dr. Murray Kinsman as chairman, Dr. Edwin Hamilton as vice-chairman, and Dr. Sarah Hardwicke as treasurer. It is their intention to keep all interested fully informed in regard to further significant developments through published statements in THE JOURNAL.

Licensure of Foreign-Trained Physicians

In 1950, the Council on Medical Education and Hospitals of the American Medical Association and the Executive Council of the Association of American Medical Colleges developed a list of foreign medical schools whose graduates they recommend for consideration on the same basis as graduates of approved medical schools in the United States. The list was offered as an advisory grouping for the use of any agency or organization that might find it helpful. The position of the councils with respect to schools not named in the list is that they neither approve nor disapprove such schools. The credentials of graduates of schools not included in this listing must be evaluated by those other agencies, licensing boards, organizations, or institutions to whom graduates of the schools apply for recognition. When the Educational Council for Foreign Medical Graduates becomes active and its proposal for the evaluation service for foreign medical graduates is put into effect, the listing of foreign medical schools will have no further value and will be discontinued.

The present requirements for foreign-trained physicians seeking medical licensure in the United States and its territories and outlying possessions are given in table 27. Foreign-trained physicians are not eligible for licensure in 10 states, the Canal Zone, and Puerto Rico. Twenty-one boards limit licensure to those who have graduated from schools in the approved listing. Other boards find the list useful in the evaluation of credentials while some boards maintain their own list of schools whose graduates are acceptable for licensure. Seven boards do not require citizenship, 15 boards require declaration of intention, and 21 boards require full citizenship. Twenty-eight boards reported that the foreign-trained physician must serve an internship or obtain further medical training in the United States. In addition to the items tabulated in this table, 19 boards have other specific requirements for foreign-trained physicians and 15 boards reported varying exemptions. The factual data pertaining to these regulations are included in the text immediately below the table.

This chart was developed by the Council on Medical Education and Hospitals of the American Medical Association in an effort to assist the foreign-trained physician seeking licensure in the United States. While an attempt has been made to present the situation as it exists, the table is intended to give only a summary of exising requirements. Persons interested in licensure should supplement these data by communicating with the licensing boards. Medical licensure in the United States is a "state right" and is entirely under the jurisdiction of the governments of the individual states. The power to license physicians is exercised through the medical licensing board of each state. Official supplementary information concerning the acceptability of foreign credentials should be obtained directly from the licensing boards.

The Council also publishes a compendium of information concerning foreign medical schools and the status of foreign medical credentials in the United States that has been prepared as an aid to foreign-trained physicians. In addition to data pertaining to medical licensure, this booklet contains sections pertaining to graduate training in the medical specialties, undergraduate medical study in the United States, advanced standing in American medical schools, and medical study in foreign medical schools.

Table 28 records the number of graduates of foreign faculties of medicine examined for medical licensure by 37 boards in 1956. The figures include both American and foreign-born physicians educated abroad. Graduates of medical schools in the Philippines, New Zealand, 16 South and Central American countries, 24 countries in Europe, and 13 countries in Asia were represented at examinations. The number totaled 1,783. Graduates of 213 medical schools and five licensing corporations were examined. The number who

Marginal Number	SCHOOL	1 Alabama P	1 Alabama F	2 Arizona P	2 Arizona F	3 California P	3 California F	4 Connecticut P	4 Connecticut F	5 Delaware P	5 Delaware F	6 District of Columbia P	6 District of Columbia F	7 Florida P	7 Florida F	8 Georgia P	8 Georgia F	9 Illinois P	9 Illinois F	10 Indiana P	10 Indiana F	11 Iowa P	11 Iowa F	12 Kansas P	12 Kansas F	13 Maine P	13 Maine F	14 Maryland P	14 Maryland F
	ARGENTINA																												
1	Universidad Nacional de Buenos Aires	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	1	1
2	Universidad Nacional de Cordoba	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
3	Universidad Nacional del Litoral, Rosario	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	AUSTRALIA																												
4	University of Adelaide Faculty of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..	0	1
5	University of Melbourne Faculty of Medicine	..	..	..	..	1	0	..	..	..	..	..	..	0	1	..	..	0	1	..	..	1	0	..	..	..	..	..	..
6	University of Sydney Medical School	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..
	AUSTRIA																												
7	Karl-Franzens Universitat, Graz	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	1	4	..	..	..	..	..	..	..	..	..	..
8	Leopold Franzens Universitat, Innsbruck	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	1	3	..	..	2	1	..	..	..	..	..	..
9	Uniwersytet Jagiellonski Wydzial Lekarski, Cracow	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	Universitat Wien	..	..	..	..	1	2	..	..	..	..	..	..	0	2	1	0	4	3	..	..	1	0	..	..	..	..	..	..
	BELGIUM																												
11	Universite Libre de Bruxelles Faculte de Medecine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	Universite Gent	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	Universite de Liege Faculte de Medecine	..	..	.	.	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1
14	Universite Catholique de Louvian Faculte de Medecine	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	2	1	..	..	1	0	..	..	..	..	0	1
	BOLIVIA																												
15	Universidad Mayor de San Andres Facultad de Ciencias Medicas, La Paz	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	BRAZIL																												
16	Faculdade de Medicina Cirurgia e Pharmacia, Bahia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	Universidade de Rio de Janeiro	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
18	Faculdade de Medicina e Cirurgia do Para	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19	University of Minas Gerais School of Medicine, Minas Gerais	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
	BULGARIA																												
20	University of Sofia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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21	Universidad de Chile, Santiago	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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22	University of Hong Kong Faculty of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	East China Union Medical College, Nanking	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
24	Peiping Union Medical College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..
25	Hsiang Ya Medical College, Changsha	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
26	Pennsylvania Medical School (St. John's), Shanghai	..	..	..	..	4	0	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..	10	0
27	Cheeloo University School of Medicine, Shantung	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
28	Women's Christian Medical College, Shanghai	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
29	National College of Medicine of Shanghai	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
30	West China Union University School of Medicine, Chengtu, Szechwan	..	..	..	..	2	1	..	..	..	..	..	..	..	..	..	..	1	2	..	..	..	..	..	..	1	0	..	..
31	Southeastern Medical College, Shanghai	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
32	Dr. Sun Yat Sen Medical College, Ling-Nan University, Canton	..	..	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
33	Aurora University French School of Medicine, Shanghai	..	..	..	..	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
34	Tung Teh Medical School, Shanghai	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1
35	Military Medical College (National Defense Center), Nanking	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1
36	National Central University College of Medicine, Nanking	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	1	0
37	Tung Nan Medical College, Shanghai	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
38	National Tung Chi University, College of Medicine, Ahgnhai, Kiangsu	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
39	National Kweiyang Medical College, Kweiyang, Kweichow	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
40	National Kiangsu Medical College, Chengkiang, Kiangsu	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
41	Fukien Provincial Medical Foochow, Fukien	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..
42	National Chung Cheng Medical College, Nan Chang	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
	CHOSEN																												
43	Severance Union Medical College, Keijo	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	COLOMBIA																												
44	Universidad Nacional Facultad de Medicina, Bogota	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
45	Universidad de Cartagena Facultad de Medicina, Cartagena	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
46	Universidad de Antioquia Facultad de Medicina, Medellin	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
47	Universidad Catolica Facultad de Medicina, Bogota	..	..	..	..	..	..	..	.	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	CUBA																												
48	Universidad de la Habana	..	..	..	..	2	2	1	2	..	..	..	..	4	7	2	0	13	22	..	..	..	..	..	..	..	..	1	2
	CZECHOSLOVAKIA																												
49	Deutsche Universitat, Prag	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	1	0	0	1
50	Universita Karlova, Praha	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	4	..	..	..	..	1	0	..	..	1	0
51	Univerzita Komenskeho, Bratislava	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..
52	Masarykova Universita, Brno	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..
	DENMARK																												
53	Kobenhavns Universitet	..	..	..	..	3	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	DOMINICAN REPUBLIC																												
54	Universidad de Santo Domingo	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
	ECUADOR																												
55	Universidad Central Facultad de Ciencias Medicas, Quito	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	1	1	0	1	..	..	..	..	..	..	..	..
56	Universidad de Cuenca Facultad de Medicina, Cuenca	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.	..	.	..	..	..	..	..	..	1	0
57	Universidad de Guayaquil Facultad de Medicina, Guayaquil	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..
	EGYPT																												
58	Egyptian University Faculty of Medicine, Cairo	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
59	Fouad First University Faculty of Medicine, Cairo	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
60	Faculty of Medicine, Alexandria University, Alexandria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..
	EL SALVADOR																												
61	Universidad de El Salvador, San Salvador	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..
	ENGLAND																												
62	University of Birmingham	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
63	University of Cambridge	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..
64	University of Durham Medical School, Kings College	..	..	..	..	2	0	0	1	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..	.	..	..	..	..
65	University of Leeds School of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
66	University of Liverpool	..	..	..	..	1	0	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..
67	University of London	..	..	1	0	2	0	1	0	..	..	..	..	..	..	..	..	1	1	..	..	1	0	..	..	..	..	1	0
68	University of Manchester	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
69	University of Oxford	..	..	..	..	1	0	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
70	University of Sheffield	..	..	..	..	2	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
71	Licentiate Royal College of Physicians London and Member Royal College of Surgeons of England	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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72	Tartu Ulikooli	..	..	..	..	..	..	..	..	1	0	..	..	..	..	1	0	0	1	..	..	..	..	..	..	..	..	..	..
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15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
Massachusetts	Michigan	Minnesota	Missouri	Nebraska	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Pennsylvania	Rhode Island	South Dakota	Tennessee	Texas	Virginia	Washington	West Virginia	Wisconsin	Hawaii, Puerto Rico	Totals	Examined—Passed	Examined—Failed	% Failed	Number of Boards Examined by	Marginal Number
P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F						
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	2 0							0 1														5	3	2	40.0	4	4
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						0 1		2 2			4 1											16	7	9	56.2	5	7
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			0 1			3 0		6 14			2 2						3 0	1 0	1 0			47	23	24	51.1	12	10
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																						1	0	1	100.0	1	15
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								0 1														1	0	1	100.0	1	18
																						1	1	0	0.0	1	19
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1 0																						1	1	0	0.0	1	22
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								2 1											1 0			5	4	1	20.0	3	24
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	1 0					5 0		6 2				1 0				2 0	7 3					42	37	5	11.9	9	26
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											1 0						2 0					4	4	0	0.0	3	29
								0 1			1 0					0 1						10	5	5	50.0	6	30
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											1 0											4	3	1	25.0	3	36
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											1 0		1 0									2	2	0	0.0	2	38
1 0																						1	1	0	0.0	1	39
																						3	2	1	33.3	2	40
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	1 0							4 11														19	6	13	68.4	5	49
1 0 1	0 1	1						2 6			3 0						1 0					25	14	11	44.0	10	50
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			1 0										1 0									3	3	0	0.0	3	59
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1 0																						2	2	0	0.0	2	62
2 0								1 0									1 0					6	5	1	16.7	5	63
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														1 0			2 0					3	3	0	0.0	2	65
								2 1									1 0		1 0			7	6	1	14.3	5	66
1 0								3 0									3 0					15	14	1	6.7	9	67
1 0									0 1			2 0										4	3	1	25.0	3	68
								1 0														3	3	0	0.0	3	69
																						2	2	0	0.0	1	70
						1 0		1 2									2 0					7	5	2	28.6	4	71
		1 1						1 4		2 0	1 0											13	7	6	46.2	7	72
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	

Marginal Number	SCHOOL	1 Alabama P	1 Alabama F	2 Arizona P	2 Arizona F	3 California P	3 California F	4 Connecticut P	4 Connecticut F	5 Delaware P	5 Delaware F	6 District of Columbia P	6 District of Columbia F	7 Florida P	7 Florida F	8 Georgia P	8 Georgia F	9 Illinois P	9 Illinois F	10 Indiana P	10 Indiana F	11 Iowa P	11 Iowa F	12 Kansas P	12 Kansas F	13 Maine P	13 Maine F	14 Maryland P	14 Maryland F
	FINLAND																												
73	Helsingfors Universitet	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
74	Faculty of Medicine Turku University, Turku	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	FRANCE																												
75	Universite de Lyon	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..
76	Universite de Montpelier	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
77	Universite de Nancy	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
78	Universite de Paris	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..	2	0	1	1	..
	GERMANY																												
79	Friedrich-Wilhelms Universitat, Berlin	..	..	..	..	1	0	0	1	..	..	..	..	..	..	..	..	0	2	..	..	..	..	1	0	..	..	1	0	..
80	Rheinische Friedrich-Wilhelms Universitat, Bonn	..	..	..	..	2	0	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
81	Schlesische-Friedrich-Wilhelms Universitat, Breslau	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
82	Friedrich-Alexanders-Universitat, Erlangen	..	..	..	..	..	..	0	1	..	..	..	..	0	1	..	..	0	9	..	..	0	1	..	..	0	1	0	1
83	Albert-Ludwigs Universitat, Freiburg	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
84	Georg-August-Universitat, Gottingen	..	..	..	..	1	0	0	1	..	..	..	..	..	..	..	..	0	3	..	..	..	..	..	..	..	..	..	..	..
85	Ernst-Moritz-Arndt Universitat, Griefswald	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..
86	Universitat Heidelberg	..	..	..	..	4	0	..	..	..	..	..	..	..	..	..	..	5	7	..	..	1	0	..	..	..	..	1	0	..
87	Thuringische Landesuniversitat, Jena	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
88	Christian-Albrechts Universitat, Kiel	..	..	..	..	2	0	..	..	..	..	..	..	..	..	..	..	0	1	..	..	1	1	..	..	..	..	..	..	..
89	Universitat Leipzig	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0	1	0	..
90	Phillips-Universitat, Marburg	..	..	..	..	1	0	..	..	1	0	..	..	..	..	..	..	0	3	..	..	..	..	..	..	..	..	..	..	..
91	Ludwig-Maximilians Universitat, Munchen	..	..	..	..	8	4	..	..	..	..	..	..	..	..	..	..	4	11	..	..	..	..	..	..	1	1	3	4	..
92	Universitat Rostock	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
93	Eberhard-Karls Universitat, Tubingen	..	..	..	..	2	0	..	..	..	..	..	..	..	..	..	..	5	4	..	..	..	..	..	..	..	..	..	..	..
94	Julius-Maximilians Universitat, Wurzburg	..	..	..	..	3	0	..	..	..	..	..	..	..	..	..	..	0	3	..	..	..	..	..	..	..	..	..	..	..
95	Hamburgische Universitat, Hamburg	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	1	5	..	..	..	..	..	..	0	1	0	1	..
96	Universitat Koln	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..
97	Johan Wolfgang Goethe Universitat, Frankfurt-am-Main	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	1	2	..
98	Westfalische Wilhelms Universitat, Munster	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
99	Medizinische Akademie Dusseldorf	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
100	Humboldt University, Medical School, Berlin	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..	1	0	..
101	Medizinische Fakultat der Johannes Guttenberg Universitat, Mainz	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..
102	Medizinische Fakultat der Freien Universitat, Berlin	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	2	1	..	..	..	..	..	..	..	..	..	..	..
	GREECE																												
103	National University of Athens	..	..	..	..	2	3	..	..	..	..	..	..	..	..	1	0	0	7	..	..	..	..	..	..	0	1	0	1	..
104	Faculty of Medicine, University of Salonika, Salonika	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	HAITI																												
105	Ecole Nationale, Port-au-Prince	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	2	..	..	..	..	..	..	..	..	0	2	..
	HONDURAS																												
106	Universidad Central de la Republica de Honduras, Tegucigalpa	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	HUNGARY																												
107	Magyar Kiralyi Pazmany Petrus Tudomanyegyetum, Budapest	..	..	..	..	1	0	0	3	..	..	..	..	..	..	..	..	2	4	..	..	..	..	..	..	0	1	..	..	..
108	Magyar Kiralyi Ferency Josef Tudomanyegyetum, Szeged	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	2	..	..	..	..	..	..	..	..	0	1	..
109	Magyar Kiralyi Erzebet Tudomanyegyetum, Pecs	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..
110	Magyar Kiralyi Tisza-Istvan Tudomanyegyetum, Debrecen	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	INDIA																												
111	University of Bombay	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
112	University of Calcutta	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..
113	University of Punjab	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
114	University of Madras Medical College	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
115	Patna University, Medical School, Patna	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
116	University of Utkal Medical College, Cuttack	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	IRAN																												
117	Madresseh Teb, Teheran	..	..	..	..	..	..	1	0	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	1	1	1	1	..
118	American School Medical Department, Urmia	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	0	..
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119	Royal Iraq Medical College, Bagdad	..	..	..	..	3	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..
	IRELAND																												
120	Queen's University, Belfast	..	..	..	..	3	0	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
121	National University of Ireland	..	..	..	..	9	1	4	3	..	..	..	..	..	..	..	..	1	3	..	..	..	..	..	..	2	0	2	1	..
122	University of Dublin	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
123	Schools of Surgery, Royal College of Surgeons in Ireland, Dublin	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..
124	Licentiate of the Royal College of Physicians of Ireland and Licentiate of the Royal College of Surgeons in Ireland	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..
125	Licentiate of the Apothecaries' Hall, Dublin	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..
	ITALY																												
126	Regia Universita di Bologna	..	..	..	..	3	1	0	1	..	..	..	..	..	..	..	..	0	3	..	..	1	1	..	..	2	3	1	1	..
127	Regia Universita di Milano	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	0	..
128	Regia Universita di Catania	..	..	..	..	1	0	1	1	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	1	1	..	..	..
129	Regia Universita di Firenze	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
130	Regia Universita di Genova	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
131	Regia Universita di Messina	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	1	..
132	Regia Universita de Modena	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..
133	Regia Universita di Napoli	..	..	..	..	2	1	0	1	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	1	1	1	1	..
134	Regia Universita di Padova	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
135	Regia Universita di Palermo	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	1	0	..	..	..
136	Regia Universita di Parma	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..
137	Regia Universita di Pavia	..	..	..	..	1	0	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
138	Regia Universita di Perugia	..	..	..	..	0	2	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..
139	Regia Universita di Pisa	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
140	Regia Universita di Roma	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	1	4	..	..	..	..	..	..	1	1	3	0	..
141	Regia Universita di Siena	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
142	Regia Universita di Torino	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	1	1	..	..	..
143	Regia Universita di Bari	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	JAPAN																												
144	Chiba University of Medicine	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..
145	Okayama Medical College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	LATVIA																												
146	Latvijas Universitate, Riga	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	0	2	1	0	..
	LEBANON																												
147	American University of Beirut	..	..	..	..	2	0	0	1	..	..	..	..	1	0	..	..	1	1	1	0	..	..	..	..	..	..	..	..	..
148	Faculte Francaise de l'Universite de St. Joseph, Beyrouth	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..
149	Syrian University Faculty of Medicine, Damascus	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..
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150	University of Kaunas	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	1	9	..	..	..	..	..	..	..	..	..	..	..
	Marginal Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14														

Massachusetts	Michigan	Minnesota	Missouri	Nebraska	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Pennsylvania	Rhode Island	South Dakota	Tennessee	Texas	Virginia	Washington	West Virginia	Wisconsin	Hawaii, Puerto Rico	Totals	Examined—Passed	Examined—Failed	% Failed	Number of Boards Examined by	Marginal Number
P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F						
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.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	74
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	3	2	1	33.3	2	75
.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	0 2	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	5	2	3	60.0	4	76
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	77
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	8 8	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	26	16	10	38.5	7	78
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	2 2	.. ..	.. ..	4 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	15	10	5	33.3	8	79
1 0	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	9	8	1	11.1	6	80
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 1	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	4	3	1	25.0	2	81
.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	3 5	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	26	6	20	76.9	10	82
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	3	2	1	33.3	3	83
.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	2 2	.. ..	.. ..	2 1	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	14	6	8	57.1	7	84
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	85
.. ..	3 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	9 3	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	35	23	12	34.3	8	86
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	87
.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	6	4	2	33.3	4	88
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 3	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	7	4	3	42.9	3	89
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 0	.. ..	2 0	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	10	7	3	30.0	6	90
1 0	1 0	2 0	1 0	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	11 4	.. ..	0 1	.. ..	.. ..	1 1	3 0	.. ..	.. ..	.. ..	.. ..	63	37	26	41.2	13	91
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 2	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	0	2	100.0	1	92
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	3 1	.. ..	.. ..	.. ..	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	18	12	6	33.3	5	93
.. ..	1 0	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	11	7	4	36.3	6	94
1 0	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	4 0	.. ..	.. ..	.. ..	.. ..	.. ..	2 0	.. ..	1 0	.. ..	.. ..	19	11	8	42.1	10	95
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	3	2	1	33.3	3	96
0 1	1 0	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	2 0	.. ..	2 0	.. ..	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	18	11	7	38.9	10	97
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	3	1	2	66.7	2	98
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	1	1	50.0	2	99
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	3	3	0	0.0	3	100
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	2	2	0	0.0	2	101
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	4	3	1	25.0	2	102
0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 2	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	20	4	16	80.0	9	103
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	104
.. ..	1 0	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 2	.. ..	.. ..	.. ..	.. ..	12	6	6	50.0	5	105
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	106
0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 11	.. ..	.. ..	3 3	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	32	9	23	71.9	8	107
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	4	0	4	100.0	3	108
.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	7	1	6	85.7	5	109
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 5	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	8	3	5	62.5	2	110
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	111
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	112
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	113
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	2	0	0.0	2	114
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	115
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	116
0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	3 4	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	2 2	.. ..	.. ..	.. ..	.. ..	19	9	10	52.6	8	117
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	3	2	1	33.3	2	118
1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	6	6	0	0	4	119
.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	3 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	10	10	0	0	5	120
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1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	122
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	1	1	50.0	1	123
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	1	1	50.0	2	124
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	125
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	6 3	.. ..	4 22	.. ..	.. ..	1 2	.. ..	1 1	.. ..	.. ..	.. ..	0 2	.. ..	1 0	.. ..	.. ..	60	20	40	66.7	12	126
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	2 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	8	5	3	37.5	5	127
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	8	4	4	50.0	5	128
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	3	1	2	66.7	3	129
.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	5	4	1	20.1	3	130
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 2	.. ..	.. ..	1 1	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	9	4	5	55.6	5	131
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 2	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	4	1	3	75.0	3	132
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 1	.. ..	9 10	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	33	16	17	51.5	8	133
.. ..	.. ..	.. ..	.. ..	.. ..	1 0	1 1	.. ..	4 2	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	12	8	4	66.7	5	134
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 1	.. ..	3 2	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	13	9	4	30.8	6	135
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	136
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 2	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	4	1	3	75.0	3	137
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	5	1	4	80.0	4	138
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 2	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	0	2	100.0	1	139
.. ..	.. ..	1 1	.. ..	.. ..	.. ..	3 1	.. ..	10 14	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	42	21	21	50.0	8	140
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	141
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 3	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	10	4	6	60.0	5	142
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 2	.. ..	0 5	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	11	3	8	72.7	4	143
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	4	2	2	50.0	3	144
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	145
.. ..	.. ..	2 0	.. ..	.. ..	0 1	.. ..	.. ..	1 13	.. ..	1 0	4 3	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	32	10	22	68.7	10	146
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	8	6	2	25.0	6	147
0 1	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	6	3	3	50.0	4	148
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	149
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 8	.. ..	.. ..	3 2	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	26	6	20	76.9	4	150

Marginal Number	SCHOOL	1 Alabama P	F	2 Arizona P	F	3 California P	F	4 Connecticut P	F	5 Delaware P	F	6 District of Columbia P	F	7 Florida P	F	8 Georgia P	F	9 Illinois P	F	10 Indiana P	F	11 Iowa P	F	12 Kansas P	F	13 Maine P	F	14 Maryland P	F
	MANCHUKUO																												
151	Mukden Medical College, Mukden	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	MEXICO																												
152	Universidad Nacional Autonoma de Mexico, Mexico City	..	..	..	..	4	1	.	.	..	..	..	..	..	..	..	..	2	7	..	..	..	..	1	0	..	..	1	0
153	Escuela de Medicina de Nuevo Leon, Monterrey	..	..	..	.	1	1	.	.	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..
154	Universidad de Guadalajara	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
155	Escuela Medico Militar, Mexico City	..	..	..	..	1	0	.	.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
156	Escuela de Medicina de Yucatan, Merida	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..
157	National Homeopathic Medical School, Mexico City	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
158	National Autonomous University of Mexico, Mexico City	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	3	..	..	..	..	..	..	..	..	..	..
	NETHERLANDS																												
159	Universiteit van Amsterdam	..	..	..	..	3	0	..	..	..	..	..	..	..	..	..	..	3	1	..	..	..	..	..	..	..	..	1	0
160	Rijks Universiteit te Groningen	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
161	Rijks Universiteit te Leiden	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	0	2	1	1	..	..	..	..	..	..	..	..
162	Rijks Universiteit te Utrecht	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	..	..	..	..	..	..
	NEW ZEALAND																												
163	University of Otago Faculty of Medicine, Dunedin	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	NICARAGUA																												
164	Universidad de Nicaragua Facultades de Medicina en Leon y en Granada	..	..	..	..	0	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	PANAMA																												
165	Facultad de Medicina de la Universidad de Panama, Panama	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	PERU																												
166	Universidad Mayor de San Marcos de Lima Facultad de Medicina	..	..	..	..	2	1	..	..	..	..	..	..	..	..	..	..	0	3	..	..	..	..	..	..	..	..	1	0
	PHILIPPINES																												
167	University of Santo Tomas, Manila	..	..	..	..	2	2	..	..	..	..	..	..	1	0	..	..	1	1	..	..	..	..	..	..	..	..	1	1
168	University of the Philippines, Manila	..	..	..	..	2	1	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	0
	POLAND																												
169	Uniwersytet Jagiellonski Wydzial Lekarski, Cracow	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
170	Uniwersytet Jana Kazimierza Wydzial Lekarski, Lwow (Lemberg)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..
171	Uniwersytet Jozefa Pilsudskiego, Warsaw	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	3	..	..	..	..	1	0	..	..	..	..
172	Uniwerzytet Posnanski Wydzial Lekarski, Poznan	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..
173	Uniwersytet Stefana Batorego Wydzial Lekarski, Wilno	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	1	0
174	Medical Academy of Danzig, Danzig	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..
	PORTUGAL																												
175	Universidad de Lisboa Faculdade de Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	RUMANIA																												
176	Universitatea din Bucuresti	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
177	Universitatea din Cluj	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	1	0
	SCOTLAND																												
178	University of Aberdeen	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
179	University of St. Andrew's, St. Andrew and Dundee	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
180	University of Edinburgh	..	..	.	..	..	..	3	1	..	..	..	..	..	..	.	.	..	..	..	..	..	..	..	..	..	..	..	..
181	University of Glasgow	..	..	..	..	1	0	1	0	1	0	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..	1	0
182	Licentiate of the Royal College of Physicians of Edinburgh, Licentiate of the Royal College of Surgeons of Edinburgh, Licentiate of the Royal Faculty of Physicians and Surgeons of Glasgow	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
183	Polish School of Medicine, Edinburgh	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
	SOUTH AFRICA																												
184	University of Cape Town, Cape Town	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	SPAIN																												
185	Universidad Central de Espana, Madrid	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
186	Universidad de Valencia Facultad de Medicina	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
187	Universidad Literaria de Valladolid Facultad de Medicina	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
188	Universidad de Santiago Facultad de Medicina	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..
189	Universidad de Salamanca Facultad de Medicina	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
	SWEDEN																												
190	Kungl, Karolinska Universitetet Medicinska Fakulteten, Lund	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
191	Karolinska Mediko-Kirurgiska Institutet, Stockholm	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..
	SWITZERLAND																												
192	Universitat Basel	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
193	Universitat Bern	..	..	..	..	1	0	2	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	0
194	Universite de Geneve	..	..	..	..	3	0	1	0	..	..	1	0	1	2	..	..	1	0	..	..	..	..	..	..	..	..	..	..
195	Universite de Lausanne	..	..	..	..	4	0	5	1	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
196	Universitat Zurich	..	..	..	..	5	0	1	0	..	..	..	..	1	0	..	..	..	..	..	..	1	0	..	..	..	..	..	..
197	University of Fribourg, Fribourg	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0
	TURKEY																												
198	University of Istanbul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
199	Central Turkey College, Aintab	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	0
	UNION OF SOCIALIST SOVIET REPUBLICS																												
200	First Leningrad Medical Institute, Leningrad	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
201	Voronezh Medical Institute	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
202	Kazan Medical Institute, Kazan	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
203	Kharkov Medical Institute	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	0
204	Kiev Medical Institute	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..
205	First Moscow Medical Institute	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
206	Odessa Medical Institute	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..
207	University of Tomsk Faculty of Medicine	..	..	.	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
208	Dnepropetrovsk Medical Institute, Dnepropetrovsk	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
209	Severo-Kavka Medical Institute	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
210	Krim Medical Institute	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..
211	Second Moscow Medical Institute	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	1	..	..	..	..	..	..	..	..	..	..
212	State Medical Institute of Vinitza	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
213	Stalino Institute of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
214	Third Medical Institute of Leningrad	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
215	Kazakh V. M. Molotov Institute of Medicine, Alma-Ata	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
216	Ashkhabad Institute of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	YUGOSLAVIA																												
217	Zagrebaska Universiteta, Zagreb	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
218	Beogradskog Universiteta, Beograd	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	2	..	..	..	..	..	..	..	..	..	..
	Totals	1		3		177		48		4		2		33		5		261		6		18		5		43		106	
	Totals, Examined, Passed	1		2		129		25		3		2		14		5		79		3		12		5		25		71	
	Totals, Examined, Failed	0		1		48		23		1		0		19		0		182		3		6		0		18		35	
	Percentage Failed	0.0		33.3		27.1		47.9		25.0		0.0		42.4		0.0		69.7		50.0		33.3		0.0		42.0		33.0	
	Marginal Number	1		2		3		4		5		6		7		8		9		10		11		12		13		14	

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
Massachusetts	Michigan	Minnesota	Missouri	Nebraska	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Pennsylvania	Rhode Island	South Dakota	Tennessee	Texas	Virginia	Washington	West Virginia	Wisconsin	Hawaii, Puerto Rico	Totals	Examined—Passed	Examined—Failed	% Failed	Number of Boards Examined by	Marginal Number
P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F	P F						
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.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	3 3	1 1	.. ..	.. ..	.. ..	16 11	54	30	24	44.4	9	152
.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	6 2	.. ..	.. ..	1 0	.. ..	.. ..	16	12	4	25.0	6	153
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	1 0	.. ..	.. ..	4	2	2	50.0	4	154
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	155
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	156
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	1	1	0	0.0	1	157
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	4	1	3	75.0	2	158
1 0	.. ..	1 0	.. ..	.. ..	.. ..	1 0	0 1	1 0	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	14	12	2	14.3	9	159
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	160
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	5 2	.. ..	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	1 0	1 6	2 0	.. ..	.. ..	.. ..	19	14	5	26.3	9	161
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	5	2	3	60.0	2	162
.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	2	0	0.0	2	163
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	0	2	100.0	1	164
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	165
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	9	4	5	55.6	4	166
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	0 2	16	9	7	43.7	7	167
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	11	8	3	27.3	5	168
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 3	.. ..	2 0	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	8	5	3	37.5	4	169
.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	4 5	.. ..	1 0	0 3	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	17	8	9	52.9	6	170
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	3 4	.. ..	.. ..	2 0	.. ..	3 0	.. ..	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	18	11	7	38.9	6	171
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 5	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	9	3	6	66.7	3	172
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	5	2	3	60.0	4	173
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	1	1	50.0	1	174
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	175
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	1	1	50.0	2	176
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	3	2	1	33.3	3	177
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	1	1	50.1	1	178
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	3	2	1	33.3	2	179
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	1 0	.. ..	7	6	1	14.3	4	180
.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	9	9	0	0.0	8	181
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	4	3	1	25.0	3	182
.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	5	5	0	0.0	5	183
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	3	2	1	33.3	1	184
0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	13 3	21	16	5	23.8	5	185
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 1	.. ..	.. ..	.. ..	.. ..	5	4	1	20.0	2	186
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 0	2	2	0	0.0	1	187
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	188
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	189
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	1	1	0	0.0	1	190
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	191
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	0 5	.. ..	.. ..	1 0	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	11	5	6	54.5	7	192
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	3 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	10	9	1	10.0	5	193
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	0 1	16 5	.. ..	.. ..	3 0	2 0	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	38	30	8	21.1	11	194
0 1	.. ..	.. ..	.. ..	.. ..	1 0	1 0	.. ..	18 7	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	43	33	10	23.2	9	195
.. ..	.. ..	.. ..	.. ..	.. ..	2 0	.. ..	.. ..	5 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	17	17	0	0.0	8	196
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	197
0 1	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 2	.. ..	.. ..	.. ..	.. ..	9	6	3	33.3	5	198
.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	199
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	2	1	1	50.0	2	200
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	201
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	202
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 2	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	5	1	4	80.0	3	203
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	1 2	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	5	1	4	80.0	2	204
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 4	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	5	1	4	80.0	1	205
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 2	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	4	0	4	100.0	3	206
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 1	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	3	1	2	66.7	3	207
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2 0	.. ..	.. ..	.. ..	.. ..	3	3	0	0.0	2	208
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	1	1	50.0	1	209
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	210
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	0	1	100.0	1	211
.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	212
.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	213
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	1	1	50.0	1	214
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 1	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	2	1	1	50.0	1	215
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1	1	0	0.0	1	216
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 2	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	.. ..	.. ..	4	2	2	50.0	2	217
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	0 2	.. ..	.. ..	0 2	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1 0	.. ..	.. ..	7	1	6	85.7	4	218
27	23	16	20	2	9	52	2	467	2	9	166	10	47	1	2	28	115	7	8	2	56	1,783					
16	23	16	11	1	6	41	0	198	0	7	117	10	39	1	2	17	84	7	8	2	35		1,012				
11	0	0	9	1	3	11	2	274	2	2	49	0	8	0	0	11	31	0	0	0	21			771			
40.7	0.0	0.0	45.0	50.0	33.3	21.6	100.0	58.7	100.0	22.2	29.5	0.0	16.7	0.0	0.0	39.3	27.0	0.0	0.0	0.0	37.5				43.2		
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	

TABLE 29.—*Physicians Examined on the Basis of Credentials Obtained in Countries Other Than the United States and Canada, 1930-1956*

Year	Number Examined	Passed	Percentage Failed
1930	167	92	44.9
1931	158	91	42.4
1932	182	96	47.3
1933	200	129	35.5
1934	285	170	40.2
1935	437	303	30.7
1936	588	382	35.0
1937	920	637	30.8
1938	1,164	716	38.5
1939	1,691	839	50.4
1940	2,088	948	54.7
1941	1,717	698	59.2
1942	1,630	890	45.4
1943	1,031	518	49.8
1944	691	325	53.0
1945	475	209	56.0
1946	495	221	55.3
1947	601	283	52.9
1948	639	311	51.3
1949	737	319	56.7
1950	799	359	55.0
1951	1,006	524	47.9
1952	1,208	648	46.3
1953	1,463	796	46.3
1954	1,612	913	42.6
1955	1 771	1,042	41.4
1956	1,783	1,012	43.2
Totals	25,568	13,501	47.6

were successful was 1,012; failures numbered 771, or 43.2%. More than 50 graduates each from the universities of Havana, Munich, Bologna, and Mexico City were tested in 1956, and more than 20 graduates each from 17 other schools were examined.

The greatest number examined by any one state was 467 in New York, of whom 193 passed and 274, or 58.7%, failed. Illinois examined 261, of whom 79 passed and 182, or 69.7%, failed. There were 177 examined in California, of whom 129 passed and 48, or 27.1% failed; 166 in Ohio, of whom 117 passed and 49, or 29.5%, failed; 115 in Virginia, of whom 84 passed and 31, or 27%, failed; and 106 in Maryland, of whom 71 passed and 35, or 33%, failed. Other states examined fewer than 100 each.

Table 29 presents the number of graduates of foreign faculties of medicine examined for medical licensure in the United States in 27 years (1930-1956). In 1936 the number of foreign-trained physicians seeking licensure in the United States began to increase, and by 1940 over three times as many were tested as in

TABLE 30.—FOREIGN-TRAINED PHYSICIANS LICENSED BY STATE BOARDS, 1946-1956

	Examination							Reciprocity and Endorsement							Grand Totals
	1946-1951	1952	1953	1954	1955	1956	Total	1946-1951	1952	1953	1954	1955	1956	Total	
Alabama	1	2	1	2	1	1	8	2	1	0	0	0	0	3	11
Arizona	1	1	1	0	2	3	8	4	0	0	1	4	1	10	18
Arkansas	1	0	0	0	0	0	1	1	0	0	0	1	0	2	3
California	191	98	95	83	135	177	779	48	1	0	1	0	0	50	829
Colorado	38	1	1	1	3	0	44	0	0	0	0	0	0	0	44
Connecticut	46	7	21	13	13	48	142	64	4	9	19	23	16	135	277
Delaware	1	2	1	1	1	4	10	3	2	0	3	0	0	8	18
District of Columbia	23	2	2	6	2	2	37	48	4	6	14	82	12	94	131
Florida	35	14	11	13	27	33	133	0	0	0	0	0	0	0	133
Georgia	11	2	6	6	2	5	32	4	1	2	3	3	6	19	51
Idaho	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Illinois	234	153	208	216	157	261	1,229	0	0	0	3	0	0	3	1,232
Indiana	3	0	0	20	2	6	31	5	2	0	16	4	9	36	67
Iowa	4	3	10	5	4	18	44	22	5	3	2	1	1	34	78
Kansas	4	1	0	1	3	5	14	0	0	0	0	0	0	0	14
Kentucky	1	0	0	0	0	0	1	2	0	0	1	0	1	4	5
Louisiana	0	0	1	3	1	0	5	0	0	0	0	0	0	0	5
Maine	11	4	13	16	44	43	131	7	3	2	7	6	4	29	160
Maryland	73	31	30	44	55	106	339	6	0	0	1	0	1	8	347
Massachusetts	38	10	10	7	11	27	103	7	1	1	4	2	4	19	122
Michigan	6	10	15	25	40	23	119	5	1	5	7	17	14	49	168
Minnesota	17	10	23	17	17	16	100	0	0	0	0	0	0	0	100
Mississippi	6	1	0	1	2	0	10	2	0	0	0	0	0	2	12
Missouri	31	5	3	4	14	20	77	5	0	0	1	0	2	8	85
Montana	1	0	0	0	0	0	1	1	1	0	1	0	0	3	4
Nebraska	3	0	0	0	0	2	5	6	0	1	1	0	0	8	13
Nevada	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
New Hampshire	5	2	1	4	3	9	24	18	1	1	6	3	5	34	58
New Jersey	32	3	6	19	23	52	135	149	21	25	24	22	42	283	418
New Mexico	1	1	0	3	4	2	11	11	1	4	1	1	2	20	31
New York State	914	171	172	184	159	467	2,067	201	31	15	8	7	5	267	2,334
North Carolina	7	4	11	8	0	2	32	2	1	2	1	2	1	9	41
North Dakota	18	6	1	0	5	9	39	0	0	0	0	0	0	0	39
Ohio	91	34	66	117	160	166	634	129	23	36	48	47	27	310	944
Oklahoma	2	0	0	0	0	0	2	2	0	1	1	1	0	5	7
Oregon	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1
Pennsylvania	29	6	7	12	6	10	70	0	0	0	0	0	0	0	70
Rhode Island	20	23	26	34	35	47	185	1	1	0	1	1	2	6	191
South Carolina	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1
South Dakota	12	5	1	2	4	1	25	1	0	0	0	0	1	2	27
Tennessee	5	1	0	1	0	2	9	2	0	1	0	0	3	6	15
Texas	26	6	18	14	16	28	108	28	0	0	0	3	4	35	143
Utah	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vermont	1	0	0	0	0	0	1	3	0	0	2	3	2	10	11
Virginia	17	8	14	23	54	115	231	13	3	0	0	0	0	16	247
Washington	15	4	2	5	5	7	38	6	3	4	4	6	5	28	66
West Virginia	4	1	4	1	0	8	18	0	0	0	0	0	0	0	18
Wisconsin	2	3	1	3	2	2	13	3	1	0	3	1	8	16	29
Wyoming	0	0	0	0	0	0	0	2	0	0	0	0	0	2	2
U. S. possessions and territories	37	13	13	29	30	56	178	18	3	3	3	0	2	29	207
Totals	2,013	648	796	943	1,042	1,783	7,225	831	115	121	188	168	180	1,603	8,828

1936. Beginning in 1944, the numbers examined decreased until 1951, when there was a noticeable increase. In each succeeding year the numbers examined has increased. There was a slight increase in 1956 over the previous year in the numbers examined, while the figure representing those who passed the examination in 1956 decreased as compared with 1955. At no time in the 27-year period did fewer than 30.7% fail in a given year. The percentage of failures in 1956 was 43.2 and for the entire period shown the overall percentage of failures was 47.6.

In table 30 figures are given for an 11-year period (1946-1956) showing the number of foreign-trained physicians licensed by each state board, both after written examinations and by endorsement of credentials. To conserve space, in the first column under the headings "Examination" and "Reciprocity and Endorsement," the figures combine the years 1946 to 1951 inclusive. Thereafter, they are given for each year. While table 29 reflects the numbers of candidates registered after examination only and indicates the percentage failing in each year, table 30 reflects the total licensed in each state. In this 11-year period,

TABLE 31.—*Graduates of Foreign Medical Faculties Representing Additions to the Medical Profession, 1956*

	Examination	Reciprocity and Endorsement	Total
Arizona	2	0	2
California	79	0	79
Colorado	1	0	1
Connecticut	20	2	22
Delaware	1	0	1
District of Columbia	2	4	6
Florida	5	0	5
Georgia	3	0	3
Illinois	76	0	76
Indiana	3	2	5
Iowa	4	0	4
Kansas	4	0	4
Maine	25	0	25
Maryland	51	0	51
Massachusetts	9	1	10
Michigan	11	0	11
Minnesota	12	0	12
Missouri	9	0	9
Nebraska	1	0	1
New Hampshire	5	2	7
New Jersey	25	0	25
New York	167	4	171
North Dakota	3	0	3
Ohio	139	0	139
Oklahoma	1	0	1
Pennsylvania	7	0	7
Rhode Island	33	0	33
South Dakota	1	0	1
Tennessee	2	0	2
Texas	16	0	16
Virginia	72	0	72
Washington	3	3	6
West Virginia	6	0	6
Wisconsin	2	0	2
Puerto Rico	34	0	34
Totals	834	18	852

CORRESPONDING OFFICERS OF BOARDS OF MEDICAL EXAMINERS IN THE UNITED STATES, TERRITORIES, AND OUTLYING POSSESSIONS

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Arizona	Mr. Robert Carpenter, Executive Secretary, 826 Security Bldg., Phoenix
Arkansas	Dr. Joe Verser, Secretary, Harrisburg
California	Dr. Louis E. Jones, Secretary, 1020 N St., Room 536, Sacramento
Colorado	Mrs. Beulah H. Hudgens, Executive Secretary, 715 Republic Bldg., Denver 2
Connecticut	Dr. Creighton Barker, Secretary, 160 St. Ronan St., New Haven
Delaware	Dr. J. S. McDaniel, Secretary, Professional Building, Dover
District of Columbia	Mr. Paul Foley, Deputy Director, 1740 Massachusetts Ave. N.W., Washington
Florida	Dr. Homer L. Pearson, Secretary, 901 N.W. 17th St., Miami 36
Georgia	Mr. C. L. Clifton, Secretary, 111 State Capitol, Atlanta 3
Idaho	Mr. Armand L. Bird, Executive Secretary, 364 Sonna Bldg., Boise
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Indiana	Miss Ruth V. Kirk, Executive Secretary, 538 K. of P. Bldg., Indianapolis
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Massachusetts	Dr. Robert C. Cochrane, Secretary, State House, Room 37, Boston 33
Michigan	Dr. E. C. Swanson, Executive Secretary, 118 Stevens T. Mason Bldg., W. Michigan Ave., Lansing 8
Minnesota	Dr. F. H. Magney, Secretary, 230 Lowry Medical Arts Bldg., St. Paul 2
Mississippi	Dr. Felix J. Underwood, Executive Officer, Old Capitol, Jackson 113
Missouri	Mr. John A. Hailey, Executive Secretary, P.O. Box 24, Jefferson City
Montana	Dr. Sidney A. Cooney, Secretary, 7 W. Sixth Avenue, Helena
Nebraska	Mr. Husted K. Watson, Director, State Capitol Building, Room 1009, Lincoln 9
Nevada	Dr. George H. Ross, Secretary, 112 N. Curry St., Carson City
New Hampshire	Dr. John S. Wheeler, Secretary, 107 State House, Concord
New Jersey	Dr. Patrick H. Corrigan, Secretary, 28 W. State St., Trenton
New Mexico	Dr. R. C. Derbyshire, Secretary, 227 E. Palace Ave., Sante Fe
New York	Dr. Stiles D. Ezell, Secretary, 23 S. Pearl St., Albany 7
North Carolina	Dr. Joseph J. Combs, Secretary, 716 Professional Bldg., Raleigh
North Dakota	Dr. C. J. Glaspel, Secretary, Grafton
Ohio	Dr. H. M. Platter, Secretary, 21 W. Broad St., Columbus 15
Oklahoma	Dr. E. F. Lester, Secretary, 813 Braniff Bldg., Oklahoma City
Oregon	Mr. Howard I. Bobbitt, Executive Secretary, 609 Failing Bldg., Portland 4
Pennsylvania	Mrs. Margaret G. Steiner, Acting Secretary, Box 911, Harrisburg
Rhode Island	Mr. Thomas B. Casey, Administrator, 366 State Office Bldg., Providence
South Carolina	Mr. N. B. Heyward, Secretary, 1329 Blanding St., Columbia
South Dakota	Mr. John C. Foster, Executive Secretary, 309 First National Bank Bldg., Sioux Falls
Tennessee	Dr. H. W. Qualls, Secretary, 1635 Exchange Bldg., Memphis 3
Texas	Dr. M. H. Crabb, Secretary, 1714 Medical Arts Bldg., Fort Worth 2
Utah	Mr. Frank E. Lees, Director, 324 State Capitol Bldg., Salt Lake City 1
Vermont	Dr. F. J. Lawliss, Secretary, Richford
Virginia	Dr. K. D. Graves, Secretary, 631 First St. S.W., Roanoke (address correspondence to Board of Medical Examiners)
Washington	Mr. Thomas A. Carter, Secretary, Capitol Building, Olympia
West Virginia	Dr. Newman H. Dyer, Secretary, State Office Building, No. 3, Charleston 5
Wisconsin	Dr. Thomas W. Tormey, Jr., Secretary, State Office Building, 1 W. Wilson St., Madison
Wyoming	Dr. Franklin D. Yoder, Secretary, State Office Building, Cheyenne
Alaska	Dr. W. M. Whitehead, Secretary, 172 S. Franklin St., Juneau
Canal Zone	Dr. Charles O. Bruce, Health Director, Balboa Heights
Guam	Dr. S. J. Provencher, Acting Secretary, Marianos Islands, Agana, Guam
Hawaii	Dr. I. L. Tilden, Secretary, 1020 Kapiolani St., Honolulu
Puerto Rico	Mr. Joaquin Mercado Cruz, Box 9156, Santurce
Virgin Islands	Dr. Earle M. Rice, St. Thomas

there were 8,828 licenses issued to foreign-trained physicians. By examination there were 7,225 issued, and by reciprocity or endorsement of credentials 1,603 were registered.

In table 31 are recorded figures regarding foreign trained physicians who were not previously licensed in the United States and therefore are additions to the medical profession. In 1956 there were 852 in this group, 834 of whom were licensed after written examination and 18 by endorsement of credentials. Similar figures for the previous six years (1950-1955) together with the figures for 1956 are given in table 32. In this seven-year period, 4,543 foreign-trained physicians were added to the physician population of the United States, 4,363 obtaining licensure by written examination and 180 by endorsement of credentials.

TABLE 32.—*Additions to the Medical Profession Representing Graduates of Foreign Medical Faculties, 1950-1956*

Year	Examination	Reciprocity and Endorsement	Totals
1950	267	41	308
1951	425	25	450
1952	545	24	569
1953	662	23	685
1954	749	23	772
1955	881	26	907
1956	834	18	852
Totals	4,363	180	4,543

BOARDS OF EXAMINERS IN THE BASIC SCIENCES

Basic science laws currently exist in 19 states, the District of Columbia, and Alaska. These laws provide for the establishment of a board of examiners in the basic sciences whose function is to determine the adequacy of background knowledge of the basic sciences of all candidates seeking licensure to practice in any of the healing arts recognized in the statutes. The basic science boards have no licensing power, but a certificate indicating successful completion of their examinations is a prerequisite for licensure wherever such boards exist. Table 33 lists the states, district, and territory where basic science laws exist and the year of their enactment. There has been no legislation enacting basic science laws since 1951.

TABLE 33.—*States Having Basic Science Laws and Year of Enactment*

Alaska	1946	Nebraska	1927
Arizona	1936	Nevada	1951
Arkansas	1929	New Mexico	1941
Colorado	1937	Oklahoma	1937
Connecticut	1925	Oregon	1934
District of Columbia	1929	Rhode Island	1940
Florida	1939	South Dakota	1939
Iowa	1936	Tennessee	1943
Michigan	1937	Texas	1949
Minnesota	1927	Washington	1927
		Wisconsin	1925

The healing are, as defined in the laws, refers to any system, treatment, operation, diagnosis, prescription, or practice for the ascertainment, cure, relief, palliation, adjustment, or correction of any human disease, ailment, deformity, injury, or unhealthy or abnormal physical or mental condition.

The basic sciences designated in the legislation vary with the different laws. All of them include anatomy, pathology, and physiology, and the majority include bacteriology and chemistry. Ten include hygiene, two diagnosis, and one requires public health. Table 34 lists the basic science boards and the subjects in which examinations are required.

The laws in some states provide for certification without examination by exemption, waiver, reciprocity, or endorsement. The credentials acceptable for

TABLE 34.—*Subjects Included in Basic Science Examinations*

	Anatomy	Bacteriology	Chemistry	Diagnosis	Hygiene	Pathology	Physiology	Public Health
Alaska	x	x	x	..	x	x	x	..
Arizona	x	x	x	..	x	x	x	..
Arkansas	x	x	x	..	x	x	x	..
Colorado	x	x	x	..	..	x	x	..
Connecticut	x	..	..	x	x	x	x	..
District of Columbia	x	x	x	..	..	x	x	..
Florida	x	x	x	..	..	x	x	..
Iowa	x	x	x	..	x	x	x	..
Michigan	x	x	x	..	..	x	x	..
Minnesota	x	x	x	..	x	x	x	..
Nebraska	x	x	x	..	x	x	x	..
Nevada	x	x	x	..	..	x	x	..
New Mexico	x	x	x	..	..	x	x	..
Oklahoma	x	x	x	..	..	x	x	..
Oregon	x	..	x	..	x	x	x	..
Rhode Island	x	x	x	..	..	x	x	..
South Dakota	x	x	x	..	..	x	x	..
Tennessee	x	x	x	..	..	x	x	..
Texas	x	x	x	..	x	x	x	x
Washington	x	x	x	..	x	x	x	..
Wisconsin	x	..	..	x	..	x	x	..

TABLE 35.—*Reciprocity, Endorsement, Waiver, or Exemption Policies of Basic Science Boards*

Credentials Accepted

Alaska

Physicians are accepted on reciprocity from those states with which the board of medical examiners has established reciprocal agreements.

Arizona

Any basic science certificate that has been obtained by an examination before the issuing board and provided that at least four subjects were passed at one sitting. Practitioners licensed in a state requiring a basic science certificate prior to the passage of basic science legislation are eligible on a previous licensure basis.

Arkansas

Reciprocity on the basis of written examination taken before all states, except Florida and Iowa. Credential of the National Board of Medical Examiners acceptable for reciprocal registration.

Colorado

Reciprocity as to examination with the following basic science boards; Alaska, Arizona, Arkansas, Michigan, Minnesota, Nebraska, Nevada, New Mexico, Oklahoma, Oregon, Rhode Island, South Dakota, Tennessee, Texas, and Washington.

Reciprocity as to examination with the Iowa Basic Science Board is granted to those candidates having made original application to that board on or before June 1, 1949. Candidates making application after that date and holding a certificate must meet the minimum requirements of the board, i.e., that the candidate pass an examination in the basic sciences under a basic science board and that he pass, at one sitting, at least four of the five subjects given by the Colorado board, with subsequent passing of the fifth subject.

With Connecticut and Wisconsin there is reciprocity as to examination in the subjects of anatomy, physiology, and pathology. Candidates from these states are required to pass the examinations in chemistry and bacteriology under this board.

TABLE 35.—*Reciprocity, Endorsement, Waiver, or Exemption Policies of Basic Science Boards—Continued*

Credentials Accepted—Continued

Connecticut
No reciprocity. Endorsement of the certificate of the National Board of Medical Examiners and of state licenses of graduates of American medical schools.

District of Columbia
Reciprocity has not been established. The board may exempt an applicant. All applications are considered on an individual basis.

Florida
No reciprocity, waiver, or exemption policies.

Iowa
On an individual basis, applications for registration by exemption are considered on the basis of a license from a board of medical examiners, the certificate of a basic science board, and the certificate of the National Board of Medical Examiners.

Michigan
Certificates issued by examination are accepted for registration by waiver from the basic science boards of Alaska, Arkansas, Colorado, District of Columbia, Minnesota, Nebraska, New Mexico, Rhode Island, South Dakota, Tennessee, Texas, Oklahoma, Nevada, Iowa, Oregon, Washington, and Wisconsin.
Applicants who present certificates from the basic science boards of Washington and Oregon are examined in bacteriology.
Applicants who present certificates from the Wisconsin Basic Science Board are examined in bacteriology and chemistry.
The Michigan board may accept, in lieu of its own examination, the basic science portion of the examination given by any legally constituted examining or licensing board in the healing arts, if such examination is equal or equivalent to the examination given by the Michigan Board.

Minnesota
Reciprocity on an automatic basis with the basic science boards of Arkansas, Colorado, Nebraska, Oregon, and Tennessee (after Feb. 9, 1950), and the part 1 examination of the National Board of Medical Examiners.
Reciprocity on an individual basis with the basic science boards of Alaska, Arizona, Connecticut, Michigan, Nevada, New Mexico, Oklahoma, South Dakota, and Texas.
Reciprocity on an individual basis with the medical licensing boards of Indiana, Kansas, Kentucky, New York (subsequent to 1925), Oklahoma, Texas, Vermont, Virginia, and Washington.
Partial credit granted for grades in certain subjects passed in examinations of medical licensing boards of Alabama, Georgia, Louisiana, New York (subsequent to 1925), North Carolina, Wisconsin, and the District of Columbia.

Nebraska
No reciprocal agreements exist. Waiver may be granted when certain requirements specified in the law have been met. These requirements relate to age of the applicant, moral character, high school graduation or equivalent, the fact of having passed an examination given by a basic science board or a licensing board in another state, the requirements of which are not less than those of Nebraska, and providing the other state concerned extends like privileges to those taking the examination in Nebraska. States eligible for consideration are those states granting exemptions from examinations to those from Nebraska where the conditions of the laws and regulations have been met, even though these conditions differ somewhat from the requirements of Nebraska. States not eligible for such consideration are those states prohibited by law from granting waiver or reciprocity.

Nevada
Reciprocity with basic science boards of Arizona, Colorado, Iowa, Minnesota, New Mexico, Oklahoma, Oregon, South Dakota, Tennessee, Texas, and Washington. Waiver with basic science boards of Arkansas, Florida, Michigan, Nebraska, and Wisconsin (partial waiver).

New Mexico
Reciprocity with basic science boards of Arizona, Arkansas, Colorado, Iowa, Michigan, Minnesota, New Mexico, Oklahoma, Oregon, South Dakota, Tennessee, Washington, and Wisconsin. Waiver granted to doctors who have been in continuous practice for 30 years or more.

Oklahoma
Applicants are reviewed on an individual basis. A basic science certificate is not a prerequisite for licensure by reciprocity but is a requirement for licensure by examination.

Oregon
Reciprocity on the basis of written examination with basic science boards of Arkansas, Colorado, Iowa, Minnesota, Nebraska, Nevada, New Mexico, Oklahoma, South Dakota, Tennessee, Texas, Washington, and Wisconsin.

Rhode Island
Endorsement after oral examination with Massachusetts Board of Registration in Medicine, and basic science boards of Colorado, District of Columbia, and Oklahoma.

South Dakota
Reciprocity with basic science boards of Arizona, Arkansas, Colorado, Iowa, Michigan, Minnesota, Nebraska, Nevada, New Mexico, Oklahoma, Oregon, Tennessee, Texas, Washington and Wisconsin.

Tennessee
Reciprocity with basic science boards of Alaska, Arizona, Arkansas, Colorado, District of Columbia, Michigan, Minnesota, Nebraska, Nevada, New Mexico, Oklahoma, Oregon, South Dakota, Texas, Washington, and Wisconsin.

Texas
Reciprocity with the basic science boards of Alaska, Arizona, Arkansas, Colorado, Iowa, Michigan, Minnesota, Nebraska, Nevada, Oklahoma, Oregon, South Dakota, Tennessee, Washington, and partial reciprocity with Wisconsin.

Washington
Reciprocity on the basis of written examination with all states having basic science boards. Examination required in subjects not covered in Washington examination.

Wisconsin
Waiver to commissioned officers of the armed forces or the Public Health Service, to an applicant who has passed part 1 of the examination of the National Board of Medical Examiners, to a physician licensed to practice medicine in a state not having a basic science law or licensed in a state before the establishment of a basic science board provided he has served an internship or has practiced for at least one year since the license was granted, to a physician licensed in Canada, and to foreign trained physicians holding an M.D. degree from an acceptable school who are licensed to practice medicine in the country in which the school attended is located.
Reciprocity on the basis of written examination with all states having basic science boards.

certification by one of these methods are outlined in table 35.

The results of examinations given and the number of certificates issued on the basis of waiver, exemption, reciprocity, or endorsement as reported by the basic science boards during 1956 are shown in tables 36 and 37. The laws do not specify that a candidate reveal his school of practice. The basic science boards were developed for the purpose of insuring, insofar as possible, that all individuals who enter into the area

TABLE 36.—*Applicants Examined in Basic Sciences, 1956*

	Examined	Passed	Failed	Failed
Alaska	6	5	1	16.7
Arizona	77	77	0*	0.0
Arkansas	382	293	89	23.2
Colorado	160	160	0*	0.0
Connecticut	212	194	18	8.5
District of Columbia	14	12	2	14.3
Florida	882	882	0*	0.0
Iowa	192	192	0*	0.0
Michigan	391	269	122	31.2
Minnesota	237	237	0*	0.0
Nebraska	156	120	36	23.1
Nevada	74	43	31	42.5
New Mexico	94	94	0*	0.0
Oklahoma	192	110	82	42.7
Oregon	163	91	72	44.2
Rhode Island	157	110	47	29.9
South Dakota	96	49	47	49.0
Tennessee	133	133	0*	0.0
Texas	208	180	28	13.5
Washington	200	175	25	12.5
Wisconsin	449	308	141	31.4
Totals	4,475	3,734	741	16.6

* Failure data not reported.

of the healing arts have what is generally considered to be an adequate preparatory background. Table 36 records the total number of candidates reported by the several boards as having been examined and the number who passed and failed. No attempt has been made to differentiate the schools of the healing arts represented by the candidates examined or certified. Seven states either had no failures or did not report

figures for failures. The percentage of candidates failing is given for those states that did submit these data.

The 21 boards in operation in 1956 examined 4,475 candidates and granted certificates of proficiency in the basic sciences by written examination to 3,734 individuals. In addition, as noted in table 37, there were 2,373 certificates issued by reciprocity, endorsement, exemption, or waiver by 18 boards. The number of applicants registered with or without examination in 1956 was 6,107. Of these, Florida issued 882, Texas 714, Michigan 611, and Wisconsin 524. Other states certified fewer than 500.

In 30 years (table 38) 84,693 certificates in the basic sciences have been issued, 58,666 by examination and 26,027 by reciprocity, endorsement, exemption, or waiver. The percentage of failures in this period was 19.5.

The fees for certification in the basic sciences in the states requiring such certification are given in table 39. Examination and endorsement meetings are held in most instances semiannually, although some boards meet quarterly. THE JOURNAL publishes semimonthly the future dates of examination and reciprocity meetings of all basic science boards.

In 1956 there were 4,475 examinations given by basic science boards; 3,734 were successful and 741 examination results were reported as unsuccessful, thereby failing to give evidence of basic preparation adequate to qualify for further consideration for licensure. Figures on how many individuals these 741 examination failures represent were not available for this report. The several basic science boards differ widely from each other in the restrictions put upon the candidate with respect to repetition of examinations that have been failed and the accumulation of credit. For example, an applicant in one state must pass at least four of the six required sections at one examination session. If he does not pass at least four of them, he must then be reexamined in all six subjects when he again applies. A poorly prepared applicant may continue to reapply and be reexamined at subsequent examinations. Thus, one person could conceivably be reported as a failure on four different examinations during a calendar year. In another state, which does not have such a limitation in its law, credit can be accumulated from one examination to the next. The variances which exist in the evaluation methods of the states makes it impossible to analyze the figures on a comparable basis from state to state.

Although it is recognized that the data presented may be useful to those seeking licensure in these states, it is advisable to supplement the information by

TABLE 37.—*Basic Science Certificates Issued by Examination, Reciprocity, Endorsement, Exemption, or Waiver, 1956*

	Certified by		
	Examination	Reciprocity, Endorsement, Exemption, or Waiver	Total Certified
Alaska	5	17	22
Arizona	77	154	231
Arkansas	293	44	337
Colorado	160	100	260
Connecticut	194	0	194
District of Columbia	12	146	158
Florida	882	0	882
Iowa	192	90	282
Michigan	269	342	611
Minnesota	237	155	392
Nebraska	120	42	162
Nevada	43	21	64
New Mexico	94	35	129
Oklahoma	110	1	111
Oregon	91	107	198
Rhode Island	110	0	110
South Dakota	49	20	69
Tennessee	133	123	256
Texas	180	534	714
Washington	175	226	401
Wisconsin	308	216	524
Totals	3,734	2,373	6,107

TABLE 38.—*Candidates for Basic Science Certification, 1927-1956*

		Examination			Reciprocity, Endorsement, Exemption, or Waiver	Total Certified
	No. of Boards	Passed	Failed	% Failed		
1927	5	294	33	10.0	27	321
1928	5	617	88	12.4	19	636
1929	7	641	93	12.6	75	716
1930	7	636	127	16.6	122	758
1931	7	634	153	19.4	141	775
1932	7	634	101	13.7	118	752
1933	8	557	104	15.7	131	688
1934	9	751	115	13.3	138	889
1935	10	794	162	16.8	114	908
1936	10	917	181	16.4	243	1,160
1937	12	1,102	242	18.0	202	1,304
1938	12	1,096	230	17.3	293	1,389
1939	14	1,110	249	18.3	1,021	2,131
1940	16	1,293	290	18.3	346	1,639
1941	17	1,751	373	17.5	353	2,104
1942	17	1,725	497	22.3	304	2,029
1943	18	2,309	410	15.1	382	2,691
1944	18	2,144	605	22.0	309	2,453
1945	18	2,339	634	21.3	584	2,923
1946	19	2,558	692	21.2	1,474	4,032
1947	19	2,633	905	25.6	960	3,593
1948	19	3,038	789	20.6	1,418	4,456
1949	20	3,656	1,515	29.5	1,480	5,136
1950	20	3,430	1,340	28.1	2,526	5,956
1951	21	3,198	735	18.7	1,939	5,137
1952	21	3,806	1,346	26.1	1,924	4,730
1953	21	3,854	1,220	24.0	1,899	5,753
1954	21	3,941	874	18.2	1,976	5,917
1955	21	3,474	447	11.1	1,936	5,410
1956	21	3,734	741	16.6	2,373	6,107
Totals		58,666	14,291	19.5	26,027	84,693

TABLE 39.—*Basic Science Registration Fees*

Alaska	$25	Nebraska	$10[3]
Arizona	20	Nevada	25
Arkansas	20	New Mexico	50[4]
Colorado	25	Oklahoma	15[2]
Connecticut	10	Oregon	10
District of Columbia	25	Rhode Island	10
Florida	10	South Dakota	15[1]
Iowa	10	Tennessee	25[5]
Michigan	10[1]	Texas	15[1]
Minnesota	25[2]	Washington	10[1]
Wisconsin	10[3]		

Fees for registration without examination: (1) $25; (2) $50; (3) $15; (4) $75; and (5) $10.

direct communication with the basic science board. The present executive corresponding officer of each of the 21 basic science boards is as follows:

Arizona	Mr. Herbert D. Rhodes, University of Arizona, Tucson.
Arkansas	Mr. S. C. Dellinger, Zoology Department, University of Arkansas, Fayetteville.
Colorado	Dr. Esther B. Starks, 1459 Ogden St., Denver 18.
Connecticut	Mrs. Regina G. Brown, 258 Bradley St., New Haven 10.
District of Columbia	Mr. Paul Foley, 1740 Massachusetts Ave. N.W., Washington 6.
Florida	Mr. M. W. Emmel, Box 340, Gainesville.
Iowa	Dr. Ben H. Peterson, Coe College, Cedar Rapids.
Michigan	Mrs. Anne Baker, 116 Stevens T. Mason Bldg., W. Michigan Ave., Lansing 15.
Minnesota	Dr. Raymond N. Bieter, 165 Millard Hall, University of Minnesota, Minneapolis.
Nebraska	Mr. Husted K. Watson, Room 1009, State Capitol Building, Lincoln 9.
Nevada	Dr. Donald G. Cooney, Box 9005, University Station, Reno.
New Mexico	Mrs. Marguerite Cantrell, Box 1522, Santa Fe.
Oklahoma	Dr. E. F. Lester, 813 Braniff Bldg., Oklahoma City.
Oregon	Dr. Earl M. Pallett, Secretary, State Board of Higher Education, Portland.
Rhode Island	Mr. Thomas B. Casey, 366 State Office Bldg., Providence.
South Dakota	Dr. Gregg M. Evans, 310 E. 15th St., Yankton.
Tennessee	Dr. O. W. Hyman, 62 S. Dunlap St., Memphis.
Texas	Bro. Raphael Wilson, 407 Perry-Brooks Bldg., Austin.
Washington	Mr. Thomas A. Carter, Department of Licenses, Capitol Building, Olympia.
Wisconsin	Mr. William H. Barber, 621 Ransom St., Ripon.
Alaska	Dr. R. Harrison Leer, Box 204, Alaska Office Bldg., Juneau.

NATIONAL BOARD OF MEDICAL EXAMINERS

The National Board of Medical Examiners is a voluntary and unofficial examining agency, the purpose of which is to prepare and to administer qualifying examinations of such merit that legal agencies governing the practice of medicine within each state may in their discretion grant successful candidates a license without further examination.

It is the function of the individual state medical licensing boards to determine who shall practice within their borders and to maintain high standards of medical practice in accordance with their own rules and regulations. In recognition of the thoroughness and widely accepted standards of the National Board examinations, its certificate is accepted as an adequate qualification by the medical licensing authorities of the states, the District of Columbia, and the territories with the following exceptions: Arkansas, Florida, Georgia, Indiana, Louisiana, Michigan, North Carolina, and Texas. The Georgia licensing board will accept certificates issued prior to October, 1953. The Michigan licensing board will accept applicants who have completed parts 1 and 2 prior to Nov. 1, 1954, but requires a special written supplemental examination. Supplemental oral examinations are required by the licensing boards of Illinois, Rhode Island, and Wyoming.

The following boards of examiners of the basic sciences accept the examinations of the National Board in lieu of their own: Alaska, Arkansas, Connecticut, Iowa, Minnesota, Nebraska, Tennessee, Wisconsin, and the District of Columbia. Diplomates of the National Board are required to take an examination in the basic sciences before obtaining a medical license in Arizona, Colorado, Florida, Michigan, Nevada, New Mexico, Oklahoma, Oregon, Rhode Island, South Dakota, Texas, and Washington.

The examinations leading to certification by the National Board are divided into three separate parts. Parts 1 and 2, which are of the multiple choice type, may be taken by students during the course of their training in the medical school. Each of the six examinations of part 1 and each of the five examinations of part 2 is developed by a separate committee which is appointed by the Board and which is composed of teachers and clinicians prominent in their own fields. Whereas formerly the Educational Testing Service of Princeton, N. J., helped in the development and analysis of the examinations of parts 1 and 2, all work pertaining to all aspects of the testing program, including scoring and statistical analysis, is now carried on in the offices of the National Board. The third, or final, part of the examination provides a total of seven hours for each candidate to demonstrate his ability to apply his knowledge of clinical problems in four major elements of general practice. In each of these subjects

TABLE 40.—*National Board Examinations in Part 1, 1922-1956*

Date	Total Examinations	Passed	Incomplete	Failed	% Failed
June, 1956	2,561	1,913	415	233	10.9
September, 1956	914	762	95	57	6.9
Totals	3,475	2,675	510	290	10.8
1922	388	263	58	67	20.3
1923	507	349	77	81	18.8
1924	591	415	69	107	20.5
1925	608	400	50	158	28.3
1926	625	436	104	85	16.3
1927	702	452	159	91	16.8
1928	843	533	231	79	12.9
1929	1,086	675	331	90	11.8
1930	1,260	801	345	114	12.5
1931	1,277	755	425	97	11.4
1932	1,307	847	371	89	9.5
1933	1,234	782	316	136	14.8
1934	1,241	809	347	85	9.5
1935	1,264	785	410	69	8.1
1936	1,344	858	363	123	12.5
1937	1,435	871	415	149	14.6
1938	1,654	986	508	160	14.0
1939	1,734	1,048	460	225	17.7
1940	1,653	1,069	375	209	16.4
1941	1,640	1,087	346	207	16.0
1942	1,867	1,204	471	192	13.8
1943	2,656	1,441	962	253	14.9
1944	4,229	2,326	1,465	438	15.9
1945	3,865	2,106	1,475	284	11.8
1946	3,148	1,695	1,189	264	13.5
1947	3,514	1,844	1,352	318	14.7
1948	3,807	2,178	1,262	367	14.4
1949	3,823	2,337	1,243	243	9.4
1950	3,678	2,558	986	334	9.0
1951	3,520	2,153	1,038	329	9.3
1952	3,989	2,467	1,147	375	9.4
1953	4,278	2,866	980	432	13.0
1954	3,252	2,286	677	289	11.2
1955	3,196	1,735	1,173	288	14.2
1956	3,475	2,675	510	290	10.8
Totals	74,699	45,892	21,690	7,117	13.7

time is provided for the candidate to study a patient or clinical specimens. He is then required to write an essay test based upon the patient or the clinical specimens that he has studied. His essay paper is then reviewed by separate examiners in each subject. After this, the examiners question the candidate in other aspects of the subject.

TABLE 41.—*National Board Examinations in Part 2, 1922-1956*

Date	Total Examinations	Passed	Incomplete	Failed	% Failed
April, 1956	1,890	1,867	3	20	1.1
June, 1956	292	286	0	6	2.1
Totals	2,182	2,153	3	26	1.2
1922	109	90	0	19	17.4
1923	192	170	2	20	10.5
1924	267	227	0	40	15.0
1925	342	309	0	33	9.6
1926	381	334	1	46	12.1
1927	361	314	1	46	12.8
1928	410	371	1	38	9.3
1929	465	399	19	47	10.5
1930	620	543	7	70	11.4
1931	719	630	2	87	12.1
1932	732	674	0	58	7.9
1933	714	651	0	63	8.8
1934	633	583	0	50	7.9
1935	689	620	0	69	10.0
1936	768	716	2	50	6.5
1937	855	803	1	51	6.0
1938	861	815	0	46	5.3
1939	938	884	0	54	5.8
1940	1,028	963	9	56	5.5
1941	1,001	954	1	46	4.8
1942	1,072	1,031	0	41	3.8
1943	1,861	1,805	0	56	3.0
1944	1,405	1,350	0	55	3.9
1945	1,599	1,565	0	34	2.1
1946	1,825	1,782	0	43	2.4
1947	1,641	1,613	0	28	1.7
1948	1,742	1,725	0	17	0.9
1949	1,737	1,691	0	46	2.6
1950	1,863	1,837	0	26	1.3
1951	2,045	2,017	0	28	1.4
1952	2,017	2,001	0	16	0.8
1953	2,200	2,145	1	54	2.4
1954	2,258	2,169	26	63	2.8
1955	2,220	2,181	3	36	1.6
1956	2,182	2,153	3	26	1.2
Totals	39,752	38,115	79	1,558	3.9

Examinations in part 1 were held during 1956 in June and September, and in part 2 in April and June. Part 3 of the examination is administered through subsidiary boards located in the major cities of the United States during the last two weeks of June of each year. Where indicated, interim part 3 examinations will be organized by an individual subsidiary board during the course of the year. The dates of all examinations are posted on medical school bulletin boards and published in THE JOURNAL and in "The National Board Examiner," the official publication of the National Board of Medical Examiners.

The National Board admits to its examination any student in good standing in approved medical schools in the United States and Canada. The National Board does not, at the present time, admit to its examinations graduates of other medical schools. Upon receipt of a request initiated by a state licensing board, a specialty board, or a medical school, an individual trained in a foreign medical school may be admitted to the National Board examinations in order to satisfy special requirements or regulations of the licensing board, specialty board, or the medical school. He is not considered a candidate for a certificate but is admitted to the examination as a service to the agency requesting the service and the grades are sent only to the board or school concerned.

The tables that are presented refer to the results of examinations in all three parts since 1922, including the number who passed and failed examinations and the number certified. This is the 35th annual compilation of these statistics. The board's first examination was given in October, 1916. From that date and up to and including a test given in June, 1921, 11 examinations were given and 268 candidates were certified. Since 1922 the examination has been divided into three parts, which must be taken and completed in the following sequence: part 1, a written examination in six basic science subjects; part 2, a written examination in five major clinical divisions and their component subjects or subdivisions; and part 3, a clinical and practical evaluation of the candidate's ability in observation, in diagnostic acumen, and in the principles of therapy, applicable to the four major elements of general practice, namely, clinical medicine, pediatrics, clinical surgery, and obstetrics and gynecology.

TABLE 42.—*National Board Examinations in Part 3, 1922-1956*

Year	Total Examinations	Passed	Failed	% Failed
1922	22	22	0	0.0
1923	82	81	1	1.2
1924	126	120	6	4.8
1925	219	206	13	5.9
1926	255	243	12	4.7
1927	293	272	21	7.2
1928	322	306	16	5.0
1929	352	337	15	4.3
1930	420	401	19	4.5
1931	437	419	18	4.1
1932	550	522	28	5.1
1933	551	526	25	4.5
1934	567	548	19	3.4
1935	598	578	20	3.3
1936	576	547	29	5.0
1937	668	630	38	5.7
1938	706	682	24	3.4
1939	770	729	41	5.3
1940	792	771	21	2.7
1941	910	885	25	2.7
1942	1,054	1,041	13	1.2
1943	1,230	1,213	17	1.4
1944	1,168	1,146	22	1.8
1945	1,245	1,232	13	1.0
1946	1,634	1,613	21	1.2
1947	1,741	1,723	18	1.0
1948	1,715	1,700	15	0.9
1949	1,685	1,674	11	0.6
1950	1,752	1,736	16	0.9
1951	1,738	1,708	30	1.7
1952	2,128	2,036	92	4.3
1953	2,039	1,979	60	2.9
1954	2,133	2,052	81	3.8
1955	2,090	2,077	13	0.6
1956	2,085	2,072	13	0.6
Totals	34,653	33,827	826	2.3

Tables 40 and 41 record the results of examinations given in parts 1 and 2 during 1956 and for each year since 1922. The data shown in these tables represent examinations conducted rather than persons examined, and the figures thus include candidates who fail and are reexamined during the same year and those who may pass parts 1 and 2 in the same year.

There were 3,475 examinations in part 1 given in 1956. 2,675 passed, and 290, or 10.8%, failed. Incomplete examinations numbered 510. In part 2, 2,182 examinations were held, 2,153 passed, and 26, or 1.2% failed. Three incomplete examinations were given.

From 1922 to 1956, inclusive, a total of 74,699 examinations have been given in part 1 and 39,752 in part 2. The successful examinations totaled 45,892 in part 1 and 38,115 in part 2. In the 35-year period shown, there have been 7,117 failures in part 1 (13.7%) and 1,558 (3.9%) in part 2.

In 1956, 2,085 tests were given in part 3; 2,072 passed, and 13 (0.6%) failed. Results of examinations in part 3 in 1956 and in the 34 preceding years are given in table 42. In 35 years, 34,653 were tested, of whom 33,827 were granted the certificate of the board. The percentage of failures in the board's final examination for the 35-year period was 2.3

TABLE 43.—*Diplomates from Individual Medical Schools, 1956*

United States	
University of Arkansas	7
College of Medical Evangelists	31
Univ. of Southern California	1
Stanford University	11
University of California, L. A.	8
University of California, S. F.	4
University of Colorado	2
Yale University	75
Georgetown University	78
George Washington University	69
Howard University	5
Medical College of Georgia	1
Chicago Medical School	63
Northwestern University	51
Stritch School of Medicine	31
University of Chicago	50
University of Illinois	31
Indiana University	2
State University of Iowa	7
University of Kansas	4
University of Louisville	3
Tulane University	5
Johns Hopkins University	8
University of Maryland	6
Boston University	74
Harvard Medical School	109
Tufts College Medical School	112
University of Michigan	7
University of Minnesota	3
St. Louis University	6
Washington University	18
Creighton University	9
University of Nebraska	3
Albany Medical College	52
State Univ. of N. Y., Brooklyn	130
University of Buffalo	66
Columbia University	109
Cornell University	68
New York Medical College	122
New York University	135
University of Rochester	43
State Univ. of N. Y., Syracuse	75
Duke University	9
University of Cincinnati	2
Western Reserve University	13
Ohio State University	2
University of Oklahoma	2
University of Oregon	16
Hahnemann Medical College	49
Jefferson Medical College	18
Temple University	43
University of Pennsylvania	33
Woman's Medical College	22
University of Pittsburgh	7
University of Tennessee	2
Vanderbilt University	1
Baylor University	1
University of Vermont	28
University of Virginia	1
Medical College of Virginia	8
University of Washington	2
University of Wisconsin	5
Marquette University	11
University of Puerto Rico	25
Total	1,994
Canada	
Univ. of British Columbia	1
Dalhousie University	3
Queen's University	5
University of Ottawa	3
Univ. of Western Ontario	1
University of Toronto	8
McGill University	36
University of Montreal	1
Laval University	1
Total	59
Foreign	
St. John's University, China	3
Natl. College of Medicine, China	3
National Kweiyang Medical College, China	2
University of Havana, Cuba	1
University of London, England	1
University of Kiel, Germany	1
National Univ. of Ireland	2
Univ. of Amsterdam, Netherlands	1
Univ. of Edinburgh, Scotland	1
University of Geneva, Switzerland	3
University of Lausanne, Switzerland	1
Total	19

The 2,072 physicians certified as diplomates in 1956 represented 64 medical schools in the United States and Puerto Rico, 9 in Canada, and 11 in other countries. The school and the number of examinees from each are included in table 43.

In 1956, there were 3,109 licenses to practice medicine issued by endorsement of the certificate of the National Board of Medical Examiners in 42 states, the District of Columbia, and the territories and outlying possessions. The number registered by each of these licensing boards is recorded in table 44. There have been 35,428 licenses issued on the basis of endorsement of the board's certificate since 1915.

TABLE 44.—*Licenses Granted on the Basis of National Board Certificates, 1956*

Alabama	6	New Hampshire	30
Arizona	11	New Jersey	194
California	450	New Mexico	5
Colorado	26	New York	850
Connecticut	220	North Dakota	3
Delaware	1	Ohio	106
District of Columbia	94	Oklahoma	11
Georgia	9	Oregon	22
Idaho	8	Pennsylvania	69
Illinois	114	Rhode Island	23
Iowa	8	South Carolina	6
Kansas	13	South Dakota	2
Kentucky	38	Tennessee	7
Maine	31	Utah	17
Maryland	98	Vermont	18
Massachusetts	275	Virginia	40
Michigan	45	Washington	54
Minnesota	69	West Virginia	16
Mississippi	6	Wisconsin	30
Missouri	37	Wyoming	3
Montana	8	Alaska, Canal Zone, Guam, Hawaii, and Puerto Rico	31
Nebraska	4		
Nevada	1		
			3,109

A number of medical schools use National Board examinations for their own purposes. In some schools the entire second year class takes part 1 at the end of the second year; in others part 2 serves as a comprehensive examination at the end of the fourth year; in still other schools both parts 1 and 2 are taken by all students. At the present time there are 35 medical schools in which 25 or more students take National Board examinations. In 23 schools, the National Board examinations are required for the entire class for either part 1 or part 2, or both parts 1 and 2.

The officers of the board are Walter A. Bloedorn, M.D., President; Creighton Barker, M.D., Vice-President; John P. Hubbard, M.D., Executive Secretary and Treasurer; William V. Clemans, Ph.D., Director of Testing Services; Christian J. Lambertsen, M.D., Assistant Secretary; George D. Ludwig, M.D., Assistant Secretary; J. S. Rodman, M.D., Honorary Medical Secretary; and Everett S. Elwood, Consultant on State Board Relations.

The address of the board is 133 S. 36th St., Philadelphia 4.

References

1. Forty-eight state boards, the District of Columbia, Hawaii, and Puerto Rico.

2. J. A. M. A. **161**:371 (May 26) 1956.

THE PRESIDENT'S PAGE

A MONTHLY MESSAGE

During the month of March I had the distinct good fortune to inspect medical installations of the U. S. armed forces in the Pacific area and to visit several medical schools and medical associations in the Far East. It also was my pleasure to have Dr. Leo Bartemeier, Chairman of the A. M. A.'s Council on Mental Health; Rear Adm. Thomas G. Hays, M. C., U. S. Navy; and Commander E. W. White, U. S. Navy, as my travel companions and advisers.

My first-hand survey of the Navy medical facilities, as well as the Army and Air Force installations, convinced me that the health and welfare of our armed forces' personnel are being handled carefully and expertly by the medical personnel assigned to that all-important task. Specifically, (1) emergency medical facilities are excellent, and they are available almost immediately to the sick or injured; (2) good hospital care is an hour or less away for almost every man and woman serving in the Pacific area, and (3) expert medical care and the finest hospitalization in extreme and very serious cases are only a few hours away.

In addition to the availability of facilities and medical personnel, I found the armed forces' physicians just as dedicated as civilian doctors in the United States. In fact, I found that the service physician was ready and willing to meet almost any challenge and to render the best possible care even if facilities or equipment are not always readily available. Indeed, I would regard the morale and dedication of the medical officers, nurses, and enlisted personnel as the finest I have seen anywhere.

To parents, wives, relatives, and friends of members of the armed forces in the Pacific, I say: You do not have to worry about medical care—quantity or quality—for servicemen. It is the best possible, and all the needs of every serviceman can, and will, be met.

I also am happy to report that medical personnel is trying to assist local populations in the care of their sick and injured, whenever and wherever possible. I have seen this assistance being rendered fully and capably at hospitals and outpatient clinics. Personally, I feel that our armed forces—particularly the medical personnel—have a great opportunity to promote good will and friendship between the people of the area and the people of the United States. So it was gratifying to see so many service doctors spreading the humanitarianism so closely identified with the United States and the American medical profession.

While I was on the Pacific inspection trip, I made approximately 20 talks to armed forces medical personnel, to students and faculty of medical schools, and to members of several medical associations. The entire trip was a pleasant and enlightening experience, and the line officers were extremely helpful in providing us with comfortable, swift, and safe transportation. A report of my findings is now in the hands of Adm. B. W. Hogan, surgeon general of the U. S. Navy.

As this is my last President's Page before the curtain falls on my term of office, I want to express my sincere appreciation to each and every member of the A. M. A. for the confidence placed in me and for elevating me to medicine's highest office in the land.

Whatever has been accomplished during my service to the A. M. A. is the direct result of the efforts of hard-working physicians and staff personnel. I claim no credit. I merely am happy to have had the opportunity to work with so many capable persons everywhere in the country and to contribute my small portion to the betterment of the A. M. A. and the medical profession.

If I had to single out one principle that has guided me during my term, it would be: Try to keep medicine as free and dedicated as you found it. I hope every physician will remember this principle, and will make it his personal duty to carry on the heritage of medical freedom that is ours today. Furthermore, it is the duty and responsibility of our profession to pass on to the younger and succeeding doctors the same privileges and opportunities to practice medicine that we have had. Our freedom in exercising our best judgment and using our capabilities in the care of the sick must never be hindered or hampered. The task of maintaining our traditions may not be easy, but it will be well worth the extra time we devote to this great cause.

To all 160,000 A. M. A. members, thank you for allowing me to serve the greatest medical organization in the world.

DWIGHT H. MURRAY, M.D., Napa, Calif.

ORGANIZATION SECTION

HEALTH IN SCHOOLS

How can educators cooperate to encourage widespread immunization against poliomyelitis? What is the viewpoint of representative physicians on competitive athletics in grade schools? How do the nation's no. 1 teachers' and physicians' organizations feel about health education and physical education programs in all schools—from elementary grade level through college? These questions have been answered definitively and with official tone within the text of a dozen resolutions adopted recently by one of the oldest interprofessional organizations in America. It has the long-breath title of Joint Committee on Health Problems in Education of the National Education Association and American Medical Association. The group has been functioning continuously for 46 years—developing effective liaison, helping formulate policy, publishing appropriate materials, and serving as a board of review on matters related to health in our nation's schools.

The five physician members, nominated by the A. M. A. Board of Trustees, all have a keen interest in school problems. The five N. E. A. representatives, selected by their organization's president, are particularly concerned with the health of pupils. One result of this intense dual approach is a combined and cohesive medical-educational view on school health matters. At a meeting March 11, 12, and 13, the Joint Committee

–Planned to draw up a check list for local communities to evaluate their own school health programs.

—Studied a progress report on a new volume, "Healthful School Living."

—Discussed a report on dental health in schools with representatives of the American Dental Association.

–Determined subcommittee progress on such topics as mental health in the classroom, health of school personnel, and health aspects of pupil transportation.

(Reelected to a second term as Joint Committee chairman was Delbert Oberteuffer, Ph.D., of the Ohio State University department of physical education. A pediatrician from Fond du Lac., Wis., Dr. E. H. Pawsat, was named vice-president, and Dr. Donald A. Dukelow, of the A. M. A. headquarters staff, was elected secretary.)

Publications and Resolutions

The fact that there is a keen interest among doctors and educators in all phases of school health is shown in the wide call for publications prepared by the Joint Committee. "Healthful School Living," third of three basic books published in the past decade ("Health Education" and "School Health Services" are the others), now rounds out all phases of the school health program. Dozens of pamphlets have been published since 1920 by the Joint Committee—and republished as often as 10 times to meet the rising demand. They have covered such varied subjects as school health policies, sex education, health appraisal, school lunch programs, sight and hearing conservation, the nurse in the school, classroom lighting, physical growth charts, fatigue, and sleep habits for children.

Among the resolutions adopted at the March meeting were those:

–Reemphasizing the need for adequate programs of health education and physical education in all schools.

–Declaring that fitness covers all aspects of organic, psychological, and social growth—and is not "testable only by muscular strength, agility, or flexibility."

—Sounding approval of an American Academy of Pediatrics report which recognizes the value of properly directed competitive sports for youth but condemns high pressure elements in athletics and body-contact sports (such as boxing and tackle football) for immature children.

—"Strongly" urging that pupils at all grade levels be given Salk poliomyelitis vaccine, and that principals, teachers, and other school employees work with the medical profession to "encourage broad community acceptance of this important preventive procedure."

—Urging widespread study and use of a newly rewritten yearbook entitled "Fit to Teach." It now is in the final stages of preparation.

—Commending the National Congress of Parents and Teachers for their promotion of a new program which tends to bring children and their parents into continual and personal contact with medical and dental resources of the community.

Committees at Local Level

While physicians and educators in this national Joint Committee set the pace for better health in our schools, their actions alone do not form the driving force at classroom level. Some 400 school health committees of county medical societies are at work day after day with teachers and principals across the land to lead the many health projects in communities.

These activities range from medical examinations to health guidance in sports. A statewide conference on physicians and schools in Connecticut brings together more than 200 doctors, public health officials, and educators. Local medical societies sponsor similar joint sessions in Wisconsin and California. And, in Montana, 11 cities take part in a "circuit" type of program featuring representatives of these professions as they cope with specific situations in each of the cities.

The A. M. A. Bureau of Health Education says, "There is evidence of increased interest and participation by medical societies in joint activity toward program planning and policy making in school health, in cooperation with other professions concerned with the health problems of children of school age." But there is more than immediate health problems involved in this interprofessional accord. Looming large is the broader concept of preventive health for years to come throughout the nation. What better place is there than a school to appraise the health of groups of children on a continuing basis? What better place could show, by example and precept, how better health can mean better students and, ultimately, better citizens?

FEDERAL MEDICAL LEGISLATION

First Session, 85th Congress

National Library of Medicine

Representative Collier (R., Ill.), in H. R. 2413, has introduced a bill which would create a National Library of Medicine to be located in Chicago. Books, collections, records, and equipment from the Armed Forces Medical Library would be turned over to the new library. The measure creating such a library, under the jurisdiction of the Public Health Service, became public law in August, 1956. Equipment, books, and collections from the Armed Forces Medical Library were transferred to it. The site of the new library will be selected by the Board of Regents. This bill was referred to the House Administration Committee.

Federal Advisory Council of Health

Representative Frelinghuysen (R., N. J.), in H. R. 2435, would establish "in the Executive Office of the President, a Federal Advisory Council of Health . . . to be composed of four persons who are members of the medical profession . . . and three persons with distinguished records in fields other than medicine, to be appointed by the President, and to hold office at his pleasure." The function of the council would be:

"First. Make a continuous evaluation of and recommendations as to policies and programs relating to Federal medical care and national health.

"Second. Advise on measures to assure adequate health manpower and hospital facilities for the Nation's health.

"Third. Review the various proposals and programs relating to hospital construction involving Federal funds, including Federal grants.

"Fourth. Advise with respect to the coordination of regional hospital services of all departments and agencies in the executive branch of the Government.

"Fifth. Advise with respect to more systematic cross-servicing between the various Federal medical agencies.

"Sixth. Advise upon measures for the adequate training and selection of the medical staffs of all Federal services.

"Seventh. Advise the executive departments and agencies on all Federal medical policies and programs.

"Eighth. Advise the Selective Service System on the mobilization of medical personnel.

"Ninth. Advise concerning systems of project grants for health-research programs of the Federal Government.

"Tenth. Report periodically to the President and to the executive departments and agencies involved, on the success or failure of Federal health programs and policies.

"Eleventh. Report to the President and advise the Bureau of the Budget and the Congress with respect to such matters as they may request.

"Twelfth. Assist the Secretary of Defense to develop recommendations for revision of the Selective Service Act, as amended, so as to effect maximum utilization of medical personnel.

"Thirteenth. Advise the Administrator of the Veterans' Administration with respect to recommendations for closing certain hospitals belonging to such Administration.

"Fourteenth. Review the manner in which the hospital facilities of the Veterans' Administration are being used and make recommendations for the disposal of more economic utilization of such facilities.

"Fifteenth. Advise the President, or any committee established or designated by him, with respect to the policies, programs, and operations of the Food and Drug Administration and the Agricultural Research Service in the Department of Agriculture, with a view to eliminating those which are no longer necessary under present conditions and eliminating conflicts and overlapping of jurisdiction and functions between departments.

"Sixteenth. Make recommendations to improve preventive health services, including those rendered in connection with medical care of Federal beneficiaries, in the interests of both health conservation and long-range economy.

"Seventeenth. Review and make recommendations to the President with respect to the health research programs of the Federal Government.

"Eighteenth. Examine the means of establishing cooperative planning among the Federal agencies which provide psychiatric care.

"Nineteenth. Service as consultant to the President's adviser on personnel with respect to making more uniform the personnel systems of the several Federal agencies using health personnel."

This measure was referred to the Committee on Interstate and Foreign Commerce.

From the Washington Office of the American Medical Association.

Registration and Reporting of Welfare and Pension Plans

A group of bills similar to each other have been introduced requiring the registration and reporting of receipts, income, disbursements, assets, liabilities, and financial activities of health, welfare, and pension plans. The reports would be made public under regulations prescribed by the Secretary of Labor or the Federal Security and Exchange Commission. The bills are H. R. 2437 and H. R. 6014, by Representative Frelinghuysen (R., N. J.); H. R. 4653, by Representative Green (D., Ore.); H. R. 5994, by McConnell (R., Pa.); H. R. 6513, by Representative Ruess (D., Wis.); S. 1121, by Senator Douglas (D., Ill.) for himself and Senators Murray (D., Mont.) and Ives (R., N. Y.); and S. 1145 by Senator Ives (R., N. Y.) for himself and Senators Allott (R., Colo.) and Smith (R., N. J.). The House measures were referred to the Committee on Education and Labor. The Senate bills were referred to the Committee on Labor and Public Welfare.

Poliomyelitis Vaccine Assistance Act Amendment

Representative Bennett (D., Fla.), in H. R. 2536, would authorize and direct the surgeon general to reallocate unused allotments of those states which do not utilize their share of the federal grants for Salk vaccine that expire June 30, 1957. He would also allow those eligible to include persons up to 40 years of age and pregnant women. This measure was referred to the Interstate and Foreign Commerce Committee.

Salk Vaccine Control by HEW

Representative Green (D., Ore.), in H. J. Res. 281, would authorize the Secretary of Health, Education, and Welfare to exercise control of the distribution, use, and selling price of poliomyelitis vaccine to Dec. 31, 1957. This bill contains a statement that "the demand for poliomyelitis vaccine far exceeds the supply." Control within each state would be placed in the state health department. The vaccine purchased or contracted to be purchased by the National Foundation for Infantile Paralysis would not be subject to the provisions of this resolution as long as such supply was owned and distributed by the foundation. This bill was referred to the Committee on Interstate and Foreign Commerce.

Water Pollution Control

Representative Rogers (D., Colo.) in H. R. 2834, and Senators Allott (R., Colo.) and Carroll (D., Colo.), in S. 1262, have introduced identical measures that would amend the Water Pollution Control Act to remove the maximum dollar limitation on grants for construction of sewage treatment works. It would, however, retain the 30% federal share limitation. These measures were referred to the Committee on Public Works.

Sanitation Facilities and Services for Indians

Representative Udall (D., Ariz.), in H. R. 2894, and Senator Chavez (D., N. Mex.), in S. 1498, have introduced measures identical to H. R. 246, by Representative Judd (R., Minn.), previously reported, which would authorize the surgeon general of the Public Health Service, to conduct surveys, until June 30, 1961, as to the need for sanitary facilities and measures, and to develop projects for the construction of such facilities among the Indian population. The Indian tribes would be encouraged to assume or share the responsibility for the construction and operation of the facilities. The measures state, "The Surgeon General shall consult with, and encourage the participation of, States and political sub-divisions thereof, and the government of the Territory of Alaska in carrying out the provisions of this Act." These measures were referred to the respective committees on Interior and Insular Affairs.

Repeal of Alaska Mental Health Enabling Act

Representative O'Neill (D., Mass.), at the request of a constituent, has introduced H. R. 3075, a measure which would repeal the Alaska Mental Health Enabling Act (Public Law 830 of the 84th Congress). This measure has been referred to the Committee on Interior and Insular Affairs.

Medicare for Certain Retired Military Personnel

Representative Boggs (D., La.), in H. R. 3208, and Senator Kefauver (D., Tenn.), in S. 1259, have introduced identical measures that would amend the Dependents' Medical Care Act to entitle certain retired members of the uniformed services to the same benefits as dependents of the uniformed services. The retired member would have to be 65 years of age or have over 20 years or more of active duty. Under the present law, retired members of the armed forces may receive medical care in military facilities. Under the proposed bills, they could receive care in civilian facilities also. These bills have been referred to the respective Armed Services committees.

U. S. Armed Forces Medical Academy

Senator Capehart (R., Ind.), in S. 596, has introduced a bill identical to H. R. 1055, by Representative Bennett (D., Fla.), that would establish an Armed Forces Medical Academy, similar to the Army, Navy, and Air Force military academies. These bills were referred to the Armed Services Committee.

Child Health and Welfare Amendments of 1957

Representative Bennett (D., Fla.), in H. R. 3359, would amend the child welfare provisions of the Social Security Act to authorize the earmarking of up to 12.5% the annual child health and welfare appro-

priations for special projects of regional or national significance. Such project grants could be made not only to state agencies administering state plans but also to public and nonprofit institutions of higher education or research with the cooperation of the state agency. At the present time grants are given to states only. This was referred to the Ways and Means Committee.

National Multiple Sclerosis Institute

Representative Hoeven (R., Iowa), in H. R. 3485, proposes to establish a National Multiple Sclerosis Institute in the United States Public Health Service. The institute would "provide for research and investigation with respect to the cause, prevention, and treatment of multiple sclerosis and related neurological diseases." There is no definition of the relationship of the present National Institute of Neurological Diseases and Blindness to the proposed Multiple Sclerosis Institute. The National Institute of Neurological Diseases and Blindness at present performs all of the functions outlined in the proposed bill. The bill was referred to the Committee on Interstate and Foreign Commerce.

Industrial Safety

Senators Smith (R., N. J.), and Ives (R., N. Y.), in S. 815, and Representative Frelinghuysen (R., N. J.), in H. R. 6045, have introduced identical bills that propose "to provide for assistance to States in their efforts to promote, establish, and maintain safe workplaces and practices in industry, thereby reducing human suffering and financial loss and increasing production through safeguarding available manpower."

According to these bills the Secretary of Labor would administer allotments to states and the state labor agency would supervise the state safety plans. The federal funds would be apportioned on a formula based on (1) the number of wage earners; (2) special hazards; (3) financial needs of respective states; and (4) such other factors as the Secretary finds relevant. Payments to states for the first two years could not exceed 75% of the total expenditure; for the second two years, 66.6%; and, thereafter, not over 50% of the total expenditures under state plans. The coal industry is covered by another provision and would not be included in this program. There was no mention in the proposal of the state health agency or of physicians. The Senate measure was referred to the Labor and Public Welfare Committee and the House measure to the Committee on Education and Labor.

National Compulsory Health Insurance

Senator Murray (D., Mont.), in S. 844, and Representative Dingell (D., Mich.), in H. R. 3764, have introduced identical measures that propose to establish a national program of compulsory health insurance. It would be financed by a 3% tax on wages up to $6,000 annually plus up to 1% of wages from the U. S. Treasury. The participants would be furnished medical and dental care and home nursing services up to 60 days, except for nervous or mental diseases or tuberculosis. State agencies would make agreements with physicians, hospitals, and other providers of care to provide medical services, or the states could employ voluntary groups providing care or could utilize various health plans. Payment could be made to physicians on a fee-for-services, per capita, or salary basis, or a combination of any two of these three methods. In cases of hospitals, payment would be made on the basis of reasonable cost. Providers of care could terminate an agreement after reasonable notice, could carry on their private practice, and would also have the right to accept or refuse patients.

Five-tenths per cent of the cost of the total health program would be authorized for grants to public and nonprofit institutions or schools for training health personnel that are needed. The Senate bill was referred to the Committee on Labor and Public Welfare and the House measure to the Committee on Interstate and Foreign Commerce.

United States Nursing Academy

Senator Ives (R., N. Y.), in S. J. Res. 30, proposes to establish a United States Academy of Nursing to furnish "an adequate and continuous flow of young women trained in the profession of nursing and qualified to meet the needs of the armed services." The Secretary of Defense would select one "cadette" for each member of Congress from among nominees submitted by the member. The President would appoint 30 "cadettes" annually. Graduates of the academy would be required to serve not less than three consecutive years in the armed forces. This proposal was referred to the Committee on Armed Services.

Tax Credit for Educational Expenses

Senator Humphrey (D., Minn.), in S. 868, and Representative Roosevelt (D., Calif.), in H. R. 4597, would provide that an individual shall be allowed, as credit against his income tax, 30% of the aggregate amount paid during the taxable year to institutions of higher education as tuition or fees either for himself or any individual. This allowance is against the income tax imposed and not against the net income upon which the income tax is based. The Senate bill was referred to the Committee on Finance and the House measure to the Committee on Ways and Means.

Representatives Perkins (D., Ky.), in H. R. 5684, and Rhodes (D., Pa.), in H. R. 4594, have introduced essentially identical measures. Both measures were referred to the Committee on Ways and Means.

Representative Jackson (R., Calif.) has introduced a similar measure, H. R. 4396, with the exception that the tax credit "shall not exceed $450 on account of such cost of education paid by the taxpayer for the education of any one person, but the total credit allowed shall be the sum of the credits on account of the payments made by the taxpayer for the education of himself and for the education of other persons." This bill was referred to the Committee on Ways and Means.

Tax Deduction for Educational Expenses

Representative Rodino (D., N. J.), in H. R. 4419, would allow a deduction from gross income in calculating income tax, for educational expenses incurred in the pursuit of education of a dependent at a college or university, including maintenance while pursuing such education. This exemption would not be limited to the standard $600 per year exemption.

Representative Fino (R., N. Y.), in H. R. 5469, would allow a deduction from the gross income for tuition paid for dependents at any level of education, elementary, secondary, or college.

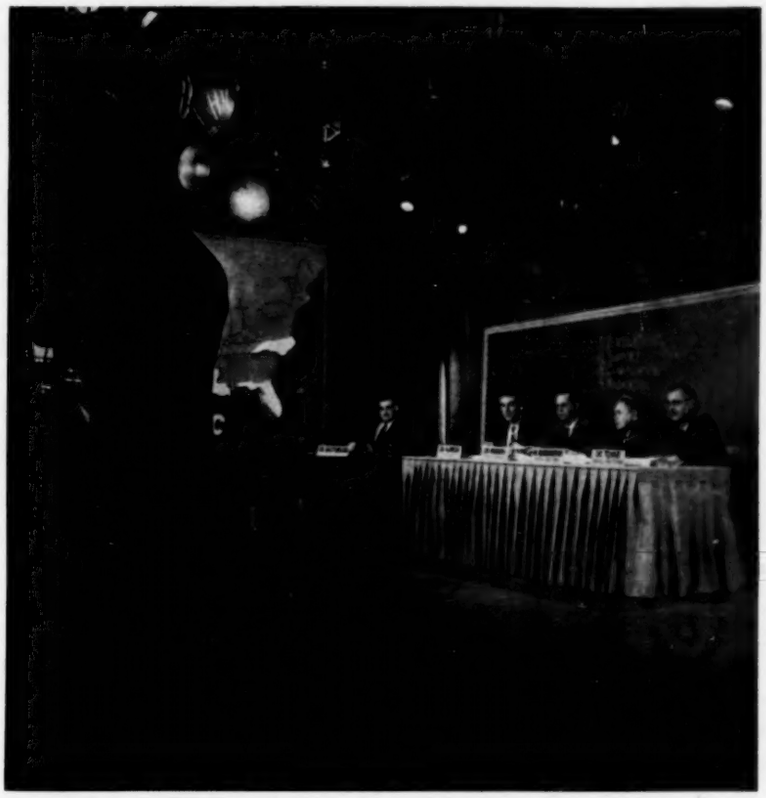
Representative Jennings (D., Va.), in H. R. 5877, would allow the taxpayer an additional income tax exemption for a spouse or dependent who is a student. The exemption would be valid when the taxpayer pays over half of the educational expenses incurred by such spouse or dependent during the calendar year in which the taxable year of the taxpayer begins. These bills have been referred to the Ways and Means Committee.

VIDEO LINKS FIVE MEDICAL MEETINGS

Some 2,000 physicians attending their annual medical association meetings in five states last month were linked as participants in a closed-circuit telecast exploring "The Physician and Emotional Disturbance." The hour-long postgraduate seminar on May 6 connected meetings in Florida, Kansas, Louisiana, Oklahoma, and North Carolina to five authorities on mental health in a Chicago television studio. A moderator in each convention city was in two-way audio communication with panel members as they were viewed on separate 9-by-12 ft. television screens. Questions from the various meeting halls were heard in the studio and answered immediately.

This "Videclinic" was presented by the Council on Mental Health of the American Medical Association and the five state societies, in cooperation with Smith, Kline & French Laboratories. The program centered upon what the physician in general practice can do for the many patients who come to him with mild emotional disturbances or psychosomatic conditions. Discussion was sparked by motion picture scenes of a patient describing his case to an inquiring family physician.

Dr. Leo H. Bartemeier, Chairman of the A. M. A. Council, was moderator of the panel. Other panel members were Dr. C. Knight Aldrich, head of the University of Chicago, department of surgery; Dr. E. I. Baumgartner, Secretary of the A. M. A. Section on General Practice; Dr. C. H. Hardin Branch, head of the University of Utah psychiatry department; and Dr. Andrew S. Tomb, chairman of the American Academy of General Practice liaison committee with the American Psychiatric Association.



The Chicago "Videclinic" in action for five state medical association meetings last month (states shown on wall map). Moderator Dr. Bartemeier is at left. Other panelists are Drs. Aldrich, Branch, Baumgartner, and Tomb. Silhouetted at left is announcer.

TRIP TO OIL REFINERY DISPENSARY

The medical department, Esso Standard Oil Company, will sponsor a field trip to the company's Bayway Refinery on one afternoon of the A. M. A. meeting in New York. In addition to a plant dispensary visit, a brief tour of refinery operations will be offered, emphasizing various aspects of environmental hygiene. The number of visitors will be limited, and requests will be honored on a first-come, first-served basis. Physicians who are interested are urged to communicate in advance with Leo Wade, Medical Director, Esso Standard Oil Company, 15 W. 51 St., New York 19. Transportation will be provided.

MEDICINE AND THE LAW

BLOOD TESTS FOR INTOXICATION UPHELD BY UNITED STATES SUPREME COURT

While driving a pickup truck on the highways of New Mexico, Paul H. Breithaupt, the petitioner, was involved in a collision with a passenger car. Three occupants of the car were killed, and he was seriously injured. A pint whiskey bottle, almost empty, was found in the glove compartment of the pickup truck. Breithaupt was taken to a hospital, and, while he was unconscious in the emergency room, the smell of liquor was detected on his breath. A state patrolman requested that a sample of Breithaupt's blood be taken. While he was still unconscious, an attending physician withdrew a sample of about 20 cc. of blood with a hypodermic needle. This sample was delivered to the patrolman, and subsequent laboratory analysis showed this blood to contain about 0.17% alcohol.

Breithaupt was thereafter charged with involuntary manslaughter. Testimony regarding the blood test and its result was admitted into evidence at trial over Briethaupt's objection. This included testimony of an expert that a person with 0.17% alcohol in his blood was under the influence of intoxicating liquor. Breithaupt was convicted and sentenced for involuntary manslaughter. He did not appeal the conviction. Subsequently, however, he sought release from his imprisonment by a petition for a writ of habeas corpus to the Supreme Court of New Mexico. That court denied the writ, and Breithaupt appealed to the United States Supreme Court. He contended that his conviction, based on the result of the involuntary blood test, deprived him of his liberty without that due process of law guaranteed him by the 14th amendment to the United States Constitution. It was argued on behalf of Breithaupt that the result of the blood test constituted an unreasonable search and seizure and that the introduction of the test result compelled him to be a witness against himself.

Breithaupt urged that the conduct of the state officers offends that "sense of justice" of which the Court spoke in *Rochin* v. *California* (342 U. S. 165 [1952]). In that case state officers broke into the home of the accused and observed him place something in his mouth. The officers forced open his mouth after considerable struggle in an unsuccessful attempt to retrieve whatever was put there. A stomach pump was later forcibly used and among the matter extracted from his stomach were found narcotic pills. The Supreme Court there held that "this course of proceeding by agents of government to obtain evidence is bound to offend even hardened sensibilities." The conviction in the Rochin case was set aside because such conduct "shocked the conscience" and was so "brutal" and "offensive" that it did not comport with traditional ideas of fair play and decency and therefore was offensive to due process.

However, in a 6-to-3 decision [1] the majority of the Supreme Court held that there was nothing comparable here to the facts in the Rochin case. The Court was of the opinion that basically the distinction rests on the fact that there is nothing "brutal" or "offensive" in the taking of a sample of blood when done, as in this case, under the protective eye of a physician. The Court said that, although Breithaupt was unconscious when his blood was taken, the absence of conscious consent, without more, does not necessarily render the taking a violation of constitutional right. Justice Tom Clark, who stated the opinion of the majority, went on to say:

> It might be a fair assumption that a driver on the highways, in obedience to a policy of the State, would consent to have a blood test made as a part of a sensible and civilized system protecting himself as well as other citizens not only from the hazards of the road due to drunken driving, but also from some use of dubious lay testimony. In fact, the State of Kansas has by statute declared that any person who operates a motor vehicle on the public highways of that State shall be deemed to have given his consent to submit to a chemical test of his breath, blood, urine, or saliva for the purpose of determining the alcoholic content of his blood. If, after arrest for operation of a motor vehicle while under the influence of intoxicating liquor, the arresting officer has reasonable grounds for the arrest, and the driver refuses to submit to the test, the arresting officer must report this fact to the proper official who shall suspend the operator's permit.

The Court concluded, in affirming the decision of the Supreme Court of New Mexico, that a blood test taken by a skilled technician is not such "conduct that shocks the conscience" or such a method of obtaining evidence that it offends a "sense of justice."

> As against the right of an individual that his person be held inviolable, even against so slight an intrusion as is involved in applying a blood test of the kind to which millions of Americans submit as a matter of course nearly every day, must be set the interest of society in the scientific determination of intoxication, one of the great causes of the mortal hazards of the road. And the more so since the test likewise may establish innocence, thus affording protection against the treachery of judgment based on one or more of the senses.

In his dissenting opinion, Chief Justice Warren observed:

> Since there clearly was no consent to the blood test, it is the nature of the invasion of the body that should be determinative of the due process question here presented. . . . We should, in my opinion, hold that due process means at least that law-enforcement officers in their efforts to obtain evidence from persons suspected of crime must stop short of bruising

the body, breaking skin, puncturing tissue or extracting body fluids, whether they contemplate doing it by force or by stealth.

In a separate dissenting opinion, Justice Douglas took this position, in which he was joined by Justice Black:

As I understand today's decision there would be a violation of due process if the blood had been withdrawn from the accused after a struggle with the police. But the sanctity of the person is equally violated and his body assaulted where the prisoner is incapable of offering resistance as it would be if force were used to overcome his resistance. In both cases evidence is used to convict a man which has been obtained from him on an involuntary basis. . . . And if the decencies of a civilized state are the test, it is repulsive to me for the police to insert needles into an unconscious person in order to get the evidence necessary to convict him, whether they find the person unconscious, give him a pill which puts him to sleep, or use force to subdue him.

References

1. *Paul H. Breithaupt, Petitioner,* v. *Morris Abrams, Warden,* 77 Sup. Ct. 69.

COUNCIL ON MEDICAL EDUCATION AND HOSPITALS

POSTGRADUATE COURSES

The following postgraduate courses, not previously listed in THE JOURNAL, have been reported to the Council:

A five-day lecture program on pediatrics will be presented June 11 to 14 at the University of California School of Medicine, San Francisco. Topics will include endocrinological and growth problems, steroid therapy, obesity, newer etiological agents of childhood infectious disease, status of poliomyelitis vaccine, purpura, congenital heart disease, and pediatric dermatology. The fee is $60. Information may be obtained from Dr. Seymour M. Farber, University of California Medical Extension, Third and Parnassus avenues, San Francisco 22.

On June 21 and 22, the University of California Extension and the University of California School of Medicine at Los Angeles will present a course on hospital disaster plans at the University of California Medical Center, Los Angeles. The course is sponsored by Medical Education for National Defense (MEND); hence there will be no fee. Topics of the course include the role of the individual hospital in statewide disaster planning, hospital disaster plans, public health problems in episodes of natural disaster, and resuscitation of large numbers of seriously injured people. Guest faculty will include medical officers from military medical centers. Physicians, hospital personnel, and others interested in attending the two-day conference should obtain registration blanks from Dr. Thomas H. Sternberg, Assistant Dean for Postgraduate Medical Education, University of California Medical Center, Los Angeles 24.

The University of Mississippi School of Medicine and the Mississippi Academy of General Practice are co-sponsoring a one-day symposium on diarrhea, June 13, at the University Medical Center in Jackson. There is no registration fee for this lecture and open-question-period course. The faculty will include guest instructors from other medical centers.

A 1-day 6-hour course, Clinical Cardiology, for physicians in general practice and part-time specialty practice will be offered June 3, by the University of Washington School of Medicine, Seattle, for a fee of $20. Educational methods used will include patient demonstration, seminar, panel discussion, lecture, and open question periods. There is no limit placed upon the number of enrollments.

Also at the University of Washington School of Medicine, there will be a 3-day 15-hour course, the Chemotherapy of Malignancy, beginning Aug. 8, 1957, for a fee of $25. This entirely lecture course is designed both for physicians in general practice and for those in full-time specialty practice.

A six-month postgraduate course, Physical Medicine and Rehabilitation, will begin July 1, 1957, at the Highland View Cuyahoga County Hospital, Cleveland, in cooperation with Western Reserve University. This course is designed for specialists in physical medicine as well as for those physicians now in residency training in this field. It will consist of three sections. Section 1, continuing for six weeks, will include 42 hours of lecture, 24 hours of conference, and 114 hours in wards and clinics. Each student's program will be planned individually so that he may concentrate his nondidactic training hours on those subjects most closely relating rehabilitation to his own private practice or study. Section 2, lasting, 12 weeks, will include 64 hours of lecture, 72 hours of conferences, 162 hours in wards and clinics, and 54 hours in affiliated facilities. Section 3, lasting 8 weeks, will include 32 hours of lecture, 40 hours of conferences, and 168 hours in wards and clinics. Inquiries should be addressed to Dr. Charles Long II, Department of Physical Medicine and Rehabilitation, Highland View Cuyahoga County Hospital, Harvard Rd., Cleveland 22.

MEDICAL NEWS

CALIFORNIA

Technicians Symposium.—University of California Extension will hold its sixth annual medical technicians symposium June 22-23 in the Life Science Building Auditorium at University of California, Los Angeles. Subjects to be covered will be "Techniques and Theory of Urine Examinations," by Dr. Ralph Goldman, Veterans Administration Hospital, Sepulveda; "Enteric Bacteriology," by Dr. Charles M. Carpenter, Los Angeles, and "Advances in Blood Clotting Mechanism Techniques" by Dr. Samuel I. Rapaport, Veterans Administration Hospital, Long Beach. Fee for the conference will be $20. Information is available at offices of University of California Extension (Medical), Los Angeles 24.

Personal.—Dr. Jerome W. Shilling, was made president of the Industrial Medical Association at the annual meeting in St. Louis. He has been in charge of the medical department for the Pacific Telephone and Telegraph Company since 1931.——The Association of State and Territorial Health Officers has conferred the Arthur T. McCormack award on Dr. Wilton L. Halverson, Los Angeles (Glendale), former California State Director of Public Health, and professor emeritus, University of California, in recognition of his "distinguished service in the fields of local, state and international health." Dr. Halverson is a past-president of the Association of State and Territorial Health Officers.

DISTRICT OF COLUMBIA

Freedmen's Hospital Alumni Meeting.—The 35th annual meeting of the Association of Former Internes and Residents of Freedmen's Hospital will be held at the hospital June 4-6. The scientific meetings and exhibits will be in the auditorium of the Biology Building of Howard University. The program committee consists of Drs. Clarence S. Greene, chairman, Mitchell W. Spellman, Walter L. Henry Jr., Coleridge M. Gill, and Albert R. Hughes. More than 1,000 physicians have received their hospital training at Freedmen's Hospital during the past 63 years.

Establish New Hospital Departments.—Dr. John M. Orem, president, board of trustees, Sibley Memorial Hospital, announced the establishment of two new departments for the proposed new Sibley Hospital. The units, not originally included in building plans, are a department of ophthalmology under Dr. William M. Hart, clinical associate professor of ophthalmology, Georgetown University School of Medicine, and a department of psychiatry under Dr. Zigmond M. Lebensohn, associate professor of psychiatry, Georgetown University School of Medicine. Sibley Memorial Hospital, which will be a 350-bed hospital and has become an integral part of the American University, will have the seventh floor of its new building given to the two projected units. The arrangements will make possible a training program for eye surgeons. The psychiatry unit will have 28 beds.

Physicians are invited to send to this department items of news of general interest, for example, those relating to society activities, new hospitals, education, and public health. Programs should be received at least three weeks before the date of meeting.

ILLINOIS

Telecasts on Health and the Weather.—A new television program, "How to Live with the Weather," was recently begun at the University of Illinois, Urbana, on the university television station WILL-TV. Dr. Frederick Sargent II, associate professor, department of physiology, gives the weather forecast twice a week and then discusses the relation of the coming weather to human health and behavior. His comments are drawn in part from folklore selected to fit the forecast and he provides the basis of each proverb given. When the weather is not going to change appreciably, Dr. Sargent deals with general topics such as clothing, ventilation, air-conditioning, history, physiology of heat regulation, spring fever, and the like.

Chicago

Michael Reese Alumni Meet.—The annual reunion of the Michael Reese Hospital Alumni Association will be held May 31. The program will include morning clinics and lunch at Michael Reese Hospital and a banquet at the Furniture Club in the evening (cocktail party at 6:30 p. m.). For information write Michael Reese Hospital Alumni Association, 29th Street and Ellis Avenue, Chicago 16.

Hospital News.—Mercy Hospital announced receipt of $84,950 from the Ford Foundation recently, representing the final payment in the foundation's nationwide hospital grants program. In June, 1956, Mercy Hospital received a similar grant of $84,950, constituting the first half of the total grant given the hospital by the foundation. Under the 200 million dollar hospital program announced on Dec. 12, 1955, Mercy Hospital became one of many Illinois hospitals to share in the grant.

MASSACHUSETTS

Dr. Shattuck Honored.—The Government of Cuba has presented to Dr. George C. Shattuck, Boston, the National Order of Merit Carlos J. Finlay in the grade of Commander. The Cuban National Order of Merit Carlos J. Finlay was established by Presidential Decree in 1928, to honor the memory of the Cuban scientist, Carlos J. Finlay. The order is given to persons of any nation who have rendered outstanding service to the cause of sanitation and public welfare of the Republic of Cuba. Each year on Dec. 3, the birthdate of Dr. Finlay, awards are made in a ceremony held in the Academy of Sciences in Havana.

MICHIGAN

Society News.—At the recent annual meeting of the Detroit Dermatological Society, the following officers were elected: president, Dr. Coleman Mopper; president-elect, Dr. George B. Sexton; secretary-treasurer, Dr. Alice E. Palmer; recorder, Robert E. Burns. All are residents of Detroit, except Dr. Sexton, who is a resident of London, Ontario, Canada.

Annual Clinic Day.—The eighth annual Clinic Day, sponsored by Bon Secours Hospital, Grosse Pointe, will be held June 12. Papers will be presented by local staff members. The occasion is in honor of Dr. Elisha J. Tamblyn, director of medical education, for his continuing service to the hospital. Members of the medical profession are invited.

Dr. Conn Honored.—Dr. Jerome W. Conn, professor of internal medicine, University of Michigan Medical School, Ann Arbor and chief of the endocrinology and metabolism unit at University Hospital, has been awarded the Claude Bernard medal from the University of Montreal's Institute of Experimental Medicine and Surgery. He received the award while serving as the annual Claude Bernard visiting professor at the University of Montreal. The honor is in recognition of work which led to the description two years ago of primary hyperaldosteronism.

NEW YORK

Military Surgeons Meet.—The New York Chapter of the Association of the Military Surgeons of the United States will hold its annual spring meeting at Governors Island June 6 at 6:00 p. m. The principal speaker will be General Dan C. Ogle, Surgeon General of the United States Air Force, who will speak on "Human Aspects of Flight into Space." The meeting will include a cocktail party and dinner to which guests may be invited. For information write Capt. Samuel Candel, MC, USNR, Secretary, New York Chapter Association of Military Surgeons of the United States, 189 Ocean Avenue, Brooklyn, N. Y.

Scholarships for Professional Study.—Each year the State of New York awards 100 scholarships to preprofessional students for study in medicine and dentistry. The examination for the next series of awards will be held on June 10. Students planning to enter medical or dental school in September, 1957, or in September, 1958, will have no other opportunity to take the examination. The next examination will be held in October, 1958. The 100 scholarships are distributed on the basis of 36 medical and 14 dental scholarships to candidates residing in the counties of New York City, and an equal number to candidates residing in the other counties of the state. Each scholarship is in effect for four years while the holder is attending an approved medical or dental school in New York State. Information may be obtained from the Bureau of Examinations and Testing, State Education Department, Albany, N. Y.

NORTH CAROLINA

University News.—The United States Public Health Service has made a two-year grant of $19,768 to Dr. Walter R. Benson of the University of North Carolina School of Medicine. The funds will be used for research of the effects of disturbance of amino acid metabolism on protein formation growth and tumor formation in animals.

Farm Fatalities Highest in State.—Farming ranks as North Carolina's most hazardous occupation, it was revealed in figures released by the Accident Preventions Section of the North Carolina State Board of Health. There were 104 residents of the State who died in farm mishaps during 1956. During the same period about 130 persons died in all other types of occupational accidents combined. The accident report showed a total of 35 drownings on farms. Accidents involving machinery took the lives of 28 residents; firearms, 11; and being struck by falling objects, 9 residents.

OHIO

Personal.—Dr. Hans W. Lawrence, medical director, Procter and Gamble Company, Cincinnati, was chosen president-elect of the Industrial Medical Association at its annual meeting in St. Louis recently.

Taylor Memorial Scholarship.—The Cleveland Health Museum has awarded the 1956 Lester Taylor Memorial Scholarship ($500) to Mr. George Hanosh, Detroit. The scholarship is given each year by the women's committee of the museum to a graduate student interested in health education. The winner spends three months at the museum, working with the staff on an original project. Working with school officials and the museum staff, Mr. Hanosh will plan the incorporation of small health museums within school buildings. He will then design materials, such as charts, posters, and simple exhibits, for use in this type of museum. These will serve as a preview to exhibits and lessons given at the museum and will bring health education to children who are not able to visit the museum itself.

OREGON

Dr. Saslow Goes to Portland.—Dr. George Saslow, clinical professor of phychiatry, Harvard Medical School, Boston, has been named to head the department of psychiatry, University of Oregon Medical School, Portland, effective June 1. He succeeds Dr. Henry H. Dixon, Portland, who will continue on the staff as clinical professor of psychiatry. Dr. Saslow presently is a consultant to the Surgeon General, U. S. Army and is on the steering committee, Office of Naval Research Study Section of the U. S. Public Health Service. He was psychiatric consultant to the Los Alamos Medical Center from 1950 to 1955 and was director of the division of psychosomatic medicine, Washington University School of Medicine, St. Louis.

PENNSYLVANIA

Personal.—Dr. Richard Schatski, Brookline, Mass., gave the recent third annual Reilly Memorial Lecture at the annual meeting of the Pennsylvania Radiological Society held in Williamsport.

Cardiovascular Grant.—The John A. Hartford Foundation, Inc., has awarded a grant of $343,800 to the Hospital of the University of Pennsylvania School of

Medicine for research in anesthesia methods, cardiac lesions, and lesions of the blood vessels. The studies will be conducted under the direction of Dr. Isidor S. Ravdin, chairman of the surgery department; Dr. Francis C. Wood, chairman, department of internal medicine; and Robert D. Dripps, chairman, department of anesthesiology.

WISCONSIN

Theobald Smith Prize.—Paul F. Clark, Ph.D., emeritus professor of medical microbiology, University of Wisconsin Medical School, Madison, has established the Theobald Smith prize of $100 to be awarded annually to the graduating medical student who submits the best experimental thesis. Dr. Clark has donated a total of $1,000 to make the prize possible for 10 years. The winning student will be selected by a faculty committee. Theobald Smith, who died in 1934, was a noted pathologist at Harvard and Princeton universities. He discovered that Texas cattle fever, which was ruining the American cattle industry in the late 19th century, was caused by a parasite passed from one animal to another by ticks.

Foreign Scholars Attend Education Conference.—Fifty foreign scholars will attend a conference on medical education to be held at the University of Wisconsin Medical School, Milwaukee, June 24-26. University Medical School faculty and about 20 guest speakers from medical schools throughout the country will discuss the philosophy and practice of American medical education and lead sessions to answer questions. Six national agencies are sponsoring the conference: the China Medical Board, the Rockefeller Foundation, the Kellogg Foundation, the Fulbright Committee, the Association of American Medical Colleges, and the U. S. Department of Health, Education, and Welfare. The two-day conference will be divided into lecture, discussion, and recreation periods. Topics by out-of-state speakers include: "The Philosophy of United States Higher Education," by Henning Larsen, Ph.D., vice-president, University of Illinois; "The Education of a Physician in the United States," by Dr. Edward L. Turner, secretary, Council on Medical Education and Hospitals, American Medical Association; "Evaluation of the Applicant for Medical Education," by Dr. Robert J. Glaser, dean, University of Colorado Medical School; and "Recent Trends in Medical Education," by Dr. T. Hale Ham, coordinator of Western Reserve University Medical School, Cleveland.

GENERAL

Tuberculosis Physicians Meeting in New York.—The annual meeting of the American Academy of Tuberculosis Physicians will be held June 1 at the Henry Hudson Hotel, New York City. Guest speaker at the luncheon will be Dr. Ezra V. Bridge, superintendent, Mineral Springs Sanatorium, Cannon Falls, Minn., whose topic will be "Chemotherapy for Patients Following Hospitalization for Tuberculosis in the United States: Results of a Survey of 424 Tuberculosis Hospitals." The presidential address will be given by Dr. Rupert C. L. Markoe, Detroit. A total of 14 papers will be presented and a business meeting will follow the program. Information may be obtained from Dr. Oscar S. Levin, Secretary, American Academy of Tuberculosis Physicians, P. O. Box 7011, Denver 6, Colo.

Meeting on Air Pollution in St. Louis.—The Air Pollution Control Association's golden jubilee meeting will be held in St. Louis June 2-6. Benjamin Linsky, president of the association, will present the keynote address, "Air Pollution Control—the Past 50 Years and the Future." James H. Carter, smoke commissioner of St. Louis, is chairman of general arrangements. Special sessions will be held in the mornings and afternoons, and a general session will be held the afternoon of June 3. A conference for control officials is scheduled for June 6. For information write Harry C. Ballman, Executive Secretary, Air Pollutions Control Association, 4400 Fifth Ave., Pittsburgh 13.

Examination of Orthoptic Technicians.—The annual examination of orthoptic technicians by the American Orthoptic Council will be conducted in August and October. The written examination will be nonassembled and will take place Aug. 22 in certain assigned cities under the proctorship of designated ophthalmologists. The oral and practical examinations will be held Oct. 12 in Chicago, just preceding the meeting of the American Academy of Ophthalmology and Otolaryngology. Application for examination will be received by the office of the chairman of examinations, Dr. Frank D. Costenbader, 1605 22nd St. N.W., Washington 8, D. C., and must be accompanied by the examination fee of $30. Applications will not be accepted after July 1.

Schizophrenia Research Grants.—Grants totalling $99,400 for 25 research projects on schizophrenia were announced recently by F. Barry Ryan Jr., president of the National Association for Mental Health. An additional $1,000 has been earmarked as stipends for medical students to spend this summer in phychiatric research. These grants were made from a special fund of $110,000 provided by the Supreme Council, 33rd Degree, Scottish Rite Freemasonry. Of this amount, $100,000 has been contributed by the organization's Northern Masonic Jurisdiction and $10,000 by its Southern Masonic Jurisdiction. The research program is being directed through the National Association for Mental Health. A total of more than $1,210,000 has already been contributed by the Scottish Rite for research in the causes and treatment of schizophrenia.

Announce Behavioral Research Grant.—A pilot training and research program, stressing the interrelation of many branches of the biological and physical sciences as the key to a better understanding of the nervous system and human behavior, has been initiated at the Albert Einstein College of Medicine of Yeshiva University, New York City, as a result of a $1,700,000 grant made by the National Institute of Mental Health, U. S. Public Health Service. Announcement of the grant, which covers a six-year period, was made by Samuel Belkin, Ph.D., president of Yeshiva University. Provision is made for awarding 36 fellowships on both predoctorial and postdoctorial levels. The program will mark a new emphasis in both medical education

and research by cutting across departmental lines and promoting an interwoven pattern of scientific research and thinking.

Medical Cruise to Scandinavia.—Duke University School of Medicine, Durham, N. C., will conduct a postgraduate seminar cruise to Scandinavia, Aug. 20-Sept. 9, sailing aboard the Swedish luxury liner M. S. Stockholm, from New York. The medical program will constitute 30 hours of acceptable category I postgraduate requirements of the American Academy of General Practice. The faculty will include Drs. William M. Nicholson, associate professor of medicine; Deryl Hart, professor of surgery; W. Banks Anderson, professor of surgery (ophthalmology); John E. Dees, professor of urology; Susan Coons Dees, associate professor of pediatrics; and Julian M. Ruffin, professor of medicine. Stops will be made in Dublin, Edinburgh, Bergen, and Copenhagen. Medical seminar meetings will be held aboard ship and in Edinburgh, Oslo, and Copenhagen. For information write Dr. William M. Nicholson, Director, Postgraduate Education, Duke University School of Medicine, Durham, N. C.

Angiologists Meet in New York.—The North American Chapter of the International Society of Angiology will hold its fifth scientific meeting June 1 at the Biltmore Hotel, New York City. A symposium, "Present Status of Surgical Management of Cardiac Valvular Insufficiencies," is scheduled, with the following participants presenting various aspects: Dr. Jesse E. Edwards, Rochester, Minn., the patho-physiologic aspects, Dr. Samuel G. Blount Jr., Denver, the medical aspects, Dr. Dwight E. Harken, Boston, the surgical management of mirtal insufficiency, and Dr. Charles A. Hufnagel, Washington, D. C., the surgical management of aortic insufficiency. The presidential address, "Patent Ductus Arteriosus with Pulmonary Hypertension," will be presented by Dr. Harris B. Shumacker Jr., Indianapolis. Invited speakers and their topics include Drs. Milton F. Bryant and John M. Howard, Atlanta, "Experimental Evaluation of Grafts Used to Replace Short Segments of Veins," and Drs. Theodore I. Jones and W. Andrew Dale, Rochester, N. Y., "Study of Peripheral Autogenous Vein Grafts." For information write Dr. Henry Haimovici, Secretary, International Society of Angiology, North American Chapter, 105 E. 90th St., New York 28.

Plastic Surgery Scholarships.—The Foundation of the American Society of Plastic and Reconstructive Surgery, recently announced its 1957 scholarship contest. Three groups of candidates are to be considered: (1) Junior classification—restricted to residents in training, and plastic surgeons who have been in practice no longer than five years; two awards, a six-month and a three-month scholarship, are offered; character references by two leading plastic surgeons must accompany the manuscript. (2) Senior classification—contestants must be in active practice of plastic and reconstructive surgery for more than five years. (3) Original contributions in plastic surgery field submitted by non-plastic surgeons—a silver plaque or certificate of honorable mention is offered for a winning essay in classifications two and three. Manuscripts should be sent by registered mail to the award committee before June 1. The subject matter of the essay must be the result of some original research in plastic and reconstructive surgery and about 5,000 words in length and unpublished. All essays shall be submitted in quadruplicate. An additional envelope shall include the contestant's name, address and affiliation, with details of professional training and percentage of practice in plastic surgery. Send manuscripts to Dr. Richard B. Stark, 20 E. 68th St., New York 21, N. Y. For information write the Foundation of the American Society of Plastic and Reconstructive Surgery, Inc., c/o Dr. Clarence R. Straatsma, President, 5 E. 83rd St., New York 28, N. Y.

Establish Registry of Pediatric Pathology.—The chairman of the committee on pediatric pathology of the American Academy of Pediatrics has announced that under the auspices of the American Academy of Pediatrics, a special registry, devoted to pediatric pathology, is to be established as a component of the American Registry of Pathology of the Armed Forces Institute of Pathology. The advantages of a registry of pediatric pathology accrue from the special character of pathology as seen in children. The registry of pediatric pathology will limit its material only with respect to the age group involved. Adequate cataloguing, maintenance of records and availability of material are primary objectives in the procedure. A consultation service will be provided for all pathologists, similar to that offered by the other component registries. Leading authorities in pediatric pathology in this country and abroad will thus be on call for questions in their special fields of interest. The material will also be made available for teaching purposes and it is hoped that in the future, the registry may provide a position for training in pediatric pathology. The support of all pathologists and pediatricians, is said to be needed to insure the success of this new division. Inquiries concerning it should be addressed to the Registry of Pathology at the Armed Forces Institute of Pathology, at Walter Reed Medical Center, 6825 16th St., N. W., Washington 25, D. C. All interested physicians are invited to visit the registry. The committee on pediatric pathology of the American Academy of Pediatrics consists of Drs. Sidney Farber, professor of Pathology, Harvard Medical School, Boston, chairman; Edith L. Potter, associate professor of obstetrics and gynecology, University of Chicago, the School of Medicine, Chicago; Irving J. Wolman, associate professor of pediatrics, University of Pennsylvania School of Medicine, Philadelphia; William B. Kiesewetter, associate professor of surgery, University of Pittsburgh School of Medicine, Pittsburgh; George H. Fetterman, associate professor of pathology, University of Pittsburgh School of Medicine, Pittsburgh; Robert S. Cleland, Los Angeles; Major Danield Stowens, MC, of the Armed Forces Institute of Pathology, is secretary of the committee.

CORRECTION

Management of Intracranial Bleeding.—Concerning his article in THE JOURNAL, March 30, 1957, Dr. Maurice L. Silver writes that the sentence beginning with the word "Emergency," nine lines from the end

of the small print under "Case 3," page 1099, should read as follows: "Emergency intubation and surgical exploration were without avail, and the patient died. Emergency exploratory examination revealed the ruptured vascular malformation, with evidence of a large clotted hematoma and additional fresh bleeding extending through the brain to the brain stem."

EXAMINATIONS AND LICENSURE

BOARDS OF MEDICAL EXAMINERS

ALABAMA: *Examination.* Montgomery, June 18-20. Sec., Dr. D. G. Gill, State Office Bldg., Montgomery 4.

ARKANSAS:* *Examination.* Little Rock, June 13-14. Sec., Dr. Joe Verser, Harrisburg.

CALIFORNIA: *Written Examination.* San Francisco, June 17-20; Los Angeles, Aug. 19-22; Sacramento, Oct. 21-24. *Oral Examination.* San Francisco, June 15; Los Angeles, August 17; San Francisco, Nov. 16. *Oral and Clinical for Foreign Graduates.* San Francisco, June 16; Los Angeles, Aug. 18; San Francisco, Nov. 17. Sec., Dr. Louis E. Jones, 1020 N St., Sacramento 14.

COLORADO:* *Examination.* Denver, June 11-12. Final date for filing application is May 13. Exec. Sec., Miss Beulah H. Hudgens, 715 Republic Bldg., Denver 2.

CONNECTICUT:* *Homeopathic. Examination.* Derby, June 11. Sec., Dr. Donald A. Davis, 38 Elizabeth St., Derby. *Regular. Examination.* Hartford, July 9-11. Sec., Dr. Creighton Barker, 160 St. Ronan St., New Haven.

DELAWARE: *Examination.* Dover, July 9-11. *Endorsement.* Dover, July 18. Sec., Dr. Joseph S. McDaniel, 225 S. State St., Dover.

FLORIDA:* *Examination.* Miami, June 23-25. Sec., Dr. Homer L. Pearson, 901 N. W. 17th St., Miami.

GEORGIA: *Examination and Reciprocity.* August and Atlanta, June. Sec., Mr. Cecil L. Clifton, 111 State Capitol, Atlanta 3.

IDAHO: *Examination and Reciprocity.* Boise, July 8-10. Exec. Sec., Mr. Armand L. Bird, 364 Sonna Bldg., Boise.

ILLINOIS: *Examination and Reciprocity.* Chicago, June 17-21. Supt. of Regis., Mr. Fredric B. Selcke, Capitol Bldg., Springfield.

INDIANA: *Examination.* Indianapolis, June 19-21. Exec. Sec., Miss Ruth V. Kirk, 538 K. of P. Bldg., Indianapolis.

KANSAS: *Examination and Endorsement.* Kansas City, June 5-6. Sec., Dr. Lyle F. Schmaus, 864 New Brotherhood Bldg., Kansas City.

KENTUCKY: *Examination.* Louisville, June 10-12. Sec., Dr. Russell E. Teague, 620 S. 6th St., Louisville.

LOUISIANA: *Examination and Reciprocity.* New Orleans, June 6-8. Sec., Dr. Edward H. Lawson, 930 Hibernia Bank Bldg., New Orleans 12.

MAINE: *Examination and Reciprocity.* August, July 9-11. Sec., Dr. Adam P. Leighton, 192 State St., Portland.

MARYLAND: *Examination.* Baltimore, June 18-21. Sec., Dr. Lewis P. Gundry, 1215 Cathedral St., Baltimore 1.

MASSACHUSETTS: *Examination and Endorsement.* Boston, July 9-12. Sec., Dr. Robert C. Cochrane, 37 State House, Boston 33.

MICHIGAN:* *Examination.* Ann Arbor and Detroit, June. Sec., Dr. E. C. Swanson, 118 Stevens T. Mason Bldg., West Michigan Ave., Lansing 8.

MISSISSIPPI: *Examination.* Jackson, June 24-25. *Reciprocity.* Jackson, June 26. Asst. Sec., Dr. R. N. Whitfield, Old Capitol, Jackson.

MONTANA: *Examination and Reciprocity.* Helena, October 1. Sec., Dr. Thomas L. Hawkins, 7 West 6th Ave., Helena.

NEBRASKA:* *Examination.* Omaha, June 17-19. Director, Mr. Husted K. Watson, Room 1009, State Capitol Bldg., Lincoln 9.

NEVADA:* *Examination and Reciprocity.* Reno, June 4. Sec., Dr. George H. Ross, 112 North Curry St., Carson City.

NEW HAMPSHIRE: *Examination and Reciprocity.* Concord, Sept. 11-13. Sec., Dr. John S. Wheeler, 107 State House, Concord.

NEW JERSEY: *Examination.* Trenton, June 18-21. Sec., Dr. Patrick H. Corrigan, 28 West State St., Trenton.

NEW YORK: *Examination.* Albany, Buffalo, New York, Rochester and Syracuse, July 9-12. Sec., Dr. Stiles D. Ezell, 23 South Pearl St., Albany 7.

NORTH CAROLINA: *Endorsement.* Raleigh, June 18. Bowling Green, July 26. *Written Examination.* Raleigh, June 17-20. Sec., Dr. Joseph J. Combs, Professional Bldg., Raleigh.

NORTH DAKOTA: *Examination.* Grand Forks, July 10-13. *Reciprocity.* Grand Forks, July 13. Sec., Dr. C. J. Glaspel, Grafton.

OHIO: *Examination and Reciprocity.* Columbus, June 13-15. Sec., Dr. H. M. Platter, 21 W. Broad St., Columbus.

OKLAHOMA:* *Examination.* Oklahoma City, June 11-12. Sec., Dr. E. F. Lester, 813 Braniff Building, Oklahoma City.

OREGON:* *Examination and Reciprocity.* Portland, July 10-11. Exec. Sec., Mr. Howard I. Bobbitt, 609 Failing Bldg., Portland.

PENNSYLVANIA: *Examination.* Philadelphia and Pittsburgh, July 10-12. Acting Sec., Mrs. Marguerite G. Steiner, Box 911, Harrisburg.

RHODE ISLAND:* *Examination.* Providence, June 27-28. Admin. of Professional Regulation, Mr. Thomas B. Casey, 366 State Office Bldg., Providence.

SOUTH CAROLINA: *Examination.* Columbia, June 25-26. Sec., Mr. N. B. Heyward, 1329 Blanding St., Columbia.

SOUTH DAKOTA:* *Examination and Reciprocity.* Place not yet determined, July 16-17. Sec., Dr. C. B. McVay, Yankton Clinic, Yankton.

TENNESSEE:* *Examination.* Nashville, June 5-6 and Memphis, June 12-13. Sec., Dr. H. W. Qualls, 1635 Exchange Bldg., Memphis 3.

TEXAS:* *Examination and Reciprocity.* Fort Worth, June 24-26. Sec., Dr. M. H. Crabb, 1714 Medical Arts Bldg., Fort Worth 2.

UTAH: *Examination.* Salt Lake City, July 11-13. Director, Mr. Frank E. Lees, 324 State Capitol Bldg., Salt Lake City 1.

VERMONT: *Examination and Reciprocity.* Burlington, June 20-22. Sec., Dr. F. J. Lawliss, Richford.

VIRGINIA: *Reciprocity.* Richmond, June 12. *Examination.* Richmond, June 13-15. Office of the Board, 631 First St., S. W., Roanoke.

WASHINGTON:* *Examination.* Seattle, July 15-17. Sec., Department of Licenses, Mr. Edward C. Dohm, Olympia.

WISCONSIN:* *Examination.* Milwaukee, July 9-11. Sec., Dr. Thomas W. Tormay, Jr., 1140 State Office Bldg., Madison 2.

WYOMING: *Examination and Reciprocity.* Cheyenne, June 3. Sec., Dr. F. D. Yoder, State Office Bldg., Cheyenne.

ALASKA:* On application in Anchorage and Juneau. Sec., Dr. W. M. Whitehead, 172 South Franklin St., Juneau.

GUAM: *Subject to Call.* Act. Sec., Dr. S. F. Provencher, Agana.

HAWAII: *Examination.* Honolulu, July 8-9. Sec., Dr. I. L. Tilden, 1020 Kapiolana St., Honolulu.

VIRGIN ISLANDS: *Endorsement.* St. Thomas, June 12. Sec., Dr. Earle M. Rice, St. Thomas.

BOARDS OF EXAMINERS IN THE BASIC SCIENCES

ARIZONA: *Examination and Reciprocity.* Tucson, June 18. Sec., Mr. Herbert D. Rhodes, University of Arizona, Tucson.

COLORADO: *Examination and Reciprocity.* Denver, Sept. 4-5. Sec., Dr. Esther B. Starks, 1459 Ogden St., Denver 18.

CONNECTICUT: *Examination.* New Haven, June 8. Exec. Asst., Mrs. Regina G. Brown, 258 Bradley St., New Haven 10.

FLORIDA: *Examination.* Miami, June 8. Sec., Mr. M. W. Emmel, Box 340, University of Florida, Gainesville.

MINNESOTA: *Examination.* Minneapolis, June 4-5. Sec., Dr. Raymond N. Bieter, 105 Millard Hall, University of Minnesota, Minneapolis.

OKLAHOMA: *Examination.* Oklahoma City, Sept. 27-28. Sec., Dr. E. F. Lester, 813 Braniff Bldg., Oklahoma City.

OREGON: *Examination.* Portland, June 1. Sec., Dr. Earl M. Pallett, University of Oregon, Eugene.

SOUTH DAKOTA: *Examination.* Vermillion, June 7-8. Sec., Dr. Gregg M. Evans, 310 E. 15th St., Yankton.

TENNESSEE: *Examination.* Memphis, July 2-3. Sec., Dr. O. W. Hyman, 62 South Dunlap St., Memphis 3.

WISCONSIN: *Examination.* Milwaukee, June 1, and Madison, Sept. 20. Sec., Mr. W. H. Barber, 621 Ransom St., Ripon.

*Basic Science Certificate required.

GOVERNMENT SERVICES

AIR FORCE

New Air Force Hospital in Libya.—The new air-conditioned 150-bed U. S. Air Force Hospital, recently dedicated at Wheelus Air Base near Tripoli, Libya, has five wards, an administrative wing, and outpatient, pharmacy, laboratory, x-ray, and physical therapy departments. The hospital is capable of providing complete services to military personnel and dependents in the area, with the exception of orthopedic surgery, otolaryngology, and ophthalmology; however, these services are covered by consultants from the 7100th U. S. A. F. Hospital in Germany. The new hospital is tied in with a widespread air evacuation system and will serve members of the armed services and their families from Morocco to the Burma border. The hospital is authorized 52 officers, 128 airmen, 4 Air Force civilians, and 34 native positions. Functioning as an area hospital in support of medical installations in Greece, Turkey, Crete, and Saudi Arabia, it will provide hospitalization or outpatient treatment for patients evacuated by air from these areas.

It happened that a group of military and civilian doctors who were on a four-week nutrition study tour through 10 Middle Eastern and Near Eastern countries were in Tripoli last November and were able to attend the dedication ceremonies. Among them were Dr. Frank B. Berry, Assistant Secretary of Defense; Rear Adm. Bartholomew W. Hogan, surgeon general of the U. S. Navy; Major Gen. James O. Gillespie, from the office of the Army Surgeon general; Dr. Richard A. Kern, professor of medicine, Temple University Medical School, Philadelphia; Dr. Edward Churchill, professor of surgery, Harvard Medical School, Boston; Major Gen. Harry Armstrong, surgeon, U. S. Air Forces in Europe; and prominent members of the Interdepartmental Committee on Nutrition for National Defense.

Air Force Commissions.—The surgeon general's office reports that scores of inquiries are being received from physicians who are noncitizens and/or graduates of foreign medical schools and who are interested in commissions in the Air Force Medical Service. A wide range of nationalities is covered, and the persons are graduates of a number of foreign nonaccredited medical schools.

To qualify for appointment in either the reserve or regular component of the Air Force, the applicant must be a graduate of a medical school accredited by the Council on Medical Education and Hospitals of the American Medical Association. The applicant must be a citizen of the United States. However, physicians who are noncitizens and are special registrants under the Universal Military Training in Service Act, as amended, may be tendered temporary appointments if they are scheduled for induction and are allocated to the Air Force. These physicians must have completed at least one year of approved internship or residency training and must be licensed to practice medicine in a state or territory of the United States or in the District of Columbia.

New U. S. A. F. Hospital at Wheelus Air Base in Libya.

ARMY

Suggestions for Medicare.—Suggestions for a revision of the "Statement of Services Provided from Civilian Sources," DA Form 1863, have been called for by Major Gen. Paul I. Robinson, executive director of the Medicare program. Considerable comment has been received by his office with respect to certain inadequacies and complexities of the existing form. Recognition of the importance of a well-designed and adequate form for the payment of hospitals and physicians has prompted the Office for Dependents' Medical Care to take immediate action to improve the form's format.

Any and all suggestions are welcome. In order to redesign and make the form final without delay, General Robinson has asked that comments and layout designs be submitted to his office not later than May 15, 1957.

Dr. Hilleman Receives Award.—In recognition of his contribution to medicine and to the Department of Defense, Dr. Maurice A. Hilleman of the Walter Reed Army Medical Center, Washington, D. C., received from Secretary of Defense, Charles Wilson, on April 18, a citation and an award for his discovery of the RI-67 group of viruses, which have been found responsible for many cases of respiratory disease. Five other distinguished civilian service awards were presented to scientists in other fields by the Secretary of Defense on April 18. Present at the ceremony were the several secretaries of military departments, key officials and officers of their staffs, and members of the families of the award recipients.

In a symposium before the Section on Experimental Medicine and Therapeutics, June 4, during the Annual Meeting of the American Medical Association in New York, Dr. Hilleman will present a paper on "Vaccination Against Adenovirus Infections." He also will have a scientific exhibit on this subject during the meeting.

NAVY

New Reserve Consultants.—Dr. William L. Rogers, San Francisco, and Dr. Gordon M. Bruce, New York City, have accepted invitations to serve on the Board of Reserve Consultants to the Bureau of Medicine and Surgery, representing, respectively, the specialties of surgery and ophthalmology. Some 17 other consultants from various parts of the country serve on the board, which meets in Washington from time to time, to advise the surgeon general on the graduate training program of the Navy Medical Corps, and to assist in choosing consultant lecturers to the staffs of naval hospitals and similar advisory duties.

VETERANS ADMINISTRATION

Home-Town Pharmacy Program.—The VA's home-town pharmacy program supplements the VA pharmacy services in providing outpatient prescription service for veterans under treatment by private physicians for service-connected disabilities. In 46 states and Hawaii, retail pharmacies participate in this program through state pharmaceutical associations. In Rhode Island and Nevada, the retail pharmacies participate through direct arrangements with the VA. The state pharmaceutical associations are paid a fee for administering the program; this is a percentage of the total value of prescriptions handled and is added to the basic prescription price charged by the pharmacist.

The director of the pharmacy service at the VA central office, Washington, D. C., Vernon O. Trygstad, said that the annual volume of the prescriptions filled by retail pharmacies in the fiscal year 1956 was $2,687,693, and that if the current prescription volume continues throughout the remainder of the present fiscal year it will exceed that of the 1956 total. He also said that, while the actual number of prescriptions fillled in 1956 by retail pharmacies decreased by 5%, the dollar volume remained about the same because the prescriptions, although fewer, often were for larger quantities of drugs.

Personal.—Dr. Chalmer Davee, director, professional services, VA Center, Hot Springs, S. D., has been appointed manager of the VA Hospital, Marion, Ill., succeeding Dr. Edward A. Welch, who retired April 30. The hospital is a 176-bed general medical and surgical facility.

Dr. F. William Henderson has been reassigned as chief, medical service, at the VA Hospital in Lake City, Fla., succeeding Dr. J. A. Baird, who retired.

Staff Positions Available.—The VA Hospital, Houston, Texas, will be opening 212 beds for psychiatric and tuberculosis-neuropsychiatric patients after July 1, 1957. Full-time staff positions, as well as regular and career residencies, are available. The hospital's teaching program is a part of the Baylor University Affiliated Hospitals Residency Program.

Hospital News.—Dr. Currier McEwen, associate professor of medicine, New York University–Bellevue Medical Center, New York City, addressed the staff of the VA Hospital at Northport, Long Island, N. Y., April 29, on "Experiences with the Long-term Use of Corticosteroids."

PUBLIC HEALTH SERVICE

Sewage Treatment Grants to One Hundred Sixty-five Municipalities.—The Public Health Service announced on April 17 that in the last two months additional federal water pollution control grants totaling $15,212,939 have been made to 165 municipalities to help build sewage treatment works. These cities and towns, ranging in population from 269 to 353,000, will add $49,928,035 of their own funds to the federal grants. Since the beginning of the program last December, a total of $19,096,474 in federal grants has been made

to 225 municipalities for sewage treatment construction, and the communities are adding $61,798,723. The average project will serve a population of about 18,000 and will cost about $310,000. The average federal grant has been about $74,000.

Congress last year authorized annual grants of 50 million dollars, up to an aggregate of 500 million dollars, for the construction of municipal sewage treatment works. It limited individual grants to $250,000 or 30% of the total project cost, whichever is less.

Poliomyelitis Vaccine.—Dr. Leroy E. Burney, the surgeon general said, on April 12, that releases of poliomyelitis vaccine and the reports from the states indicated that the vaccine shortage had eased somewhat in the last several days. He reported that 5,200,000 cc. of newly produced vaccine had been released so far in April and that larger amounts were expected during the latter half of the month.

The surgeon general reported that over 59 million Americans had received one or more injections since the vaccine first became available on April 12, 1955. Many of these persons, however, need second or third injections to complete the recommended schedule of three doses. Dr. Burney also said that the incidence of poliomyelitis so far this year is remaining well below the 1956 incidence. From Jan. 1 to April 5, 1957, only 528 cases had been reported as compared to 1,067 for the same period last year. To date, states and territories have received $46,300,000 of the $53,000,000 in federal grants available to them under the Poliomyelitis Vaccination Assistance Act of 1955, and they expect to spend the remainder before the act expires on June 30, 1957.

Begin Survey of Nation's Health.—On May 6 interviewers began visiting selected households throughout the nation to obtain information for the National Health Survey, the surgeon general has announced. They ask questions about illness in the family, accidents and injuries, disability, hospitalization, and medical and dental care. The surgeon general said, "This is the first time in 20 years that an effort has been made to collect these facts on a comprehensive basis."

The household interviewing will be done by the Bureau of the Census and will be carried on continuously. Each month a different group of households will be visited. Since the size of the national sample is limited to 3,000 households per month, the number of households interviewed in any one area will be small. The National Health Survey is being undertaken under legislation enacted by the last Congress. The information collected in the household interviews will be kept confidential, and only statistical totals will be published.

New Coast Guard Medical Chief.—Dr. Richard B. Holt, a senior career medical officer of the Public Health Service, has been appointed chief medical officer of the U. S. Coast Guard, effective July 1, succeeding Dr. Joseph F. van Ackeren, who is retiring after 31 years of service. As chief medical officer of the Coast Guard, Dr. Holt will hold the rank of assistant surgeon general, comparable to that of rear admiral (upper half). He will be responsible for the supervision of all physicians, dentists, and nurses detailed to the Coast Guard, and will serve as liaison officer between the Coast Guard medical program and the Bureau of Medicine and Surgery of the U. S. Navy. Dr. Holt entered the Public Health Service in 1927.

Inactive Reserves.—The Public Health Service announced April 28 the appointment of 172 doctors, nurses, and other professional persons to the inactive reserve component of its commissioned officer corps. The service is organizing and training health and medical personnel throughout the United States and its territories for emergency duty in times of national crisis. Officers of the commissioned reserve are trained to serve in critical situations affecting the health and well-being of large numbers of people. In emergencies, these officers would serve in posts for which their professional training and experience have best fitted them. They would be called out principally to reinforce the staffs of official state and local health agencies and to augment the Public Health Service operating staff.

Study of Nutritional Status of Indians.—The Public Health Service has appointed seven research and nutrition authorities to serve as consultants on the nutritional status of American Indians. This committee, which plans to meet twice a year, will consider priorities for the nutrition research needed. It will review nutrition research projects involving Indians that are proposed to the Public Health Service by institutions and individuals.

The members of the committee are Dr. William J. Darby, Nashville, Tenn.; Dr. Olaf Michelsen, Bethesda., Md.; Dr. John Adair, Sandoval, N. Mex.; Dr. Robert E. Shank, St. Louis.; Dr. Charlotte Young, Ithaca, N. Y.; Dr. Luther L. Terry, Bethesda, Md.; and Miss Marjorie Heseltine, Washington, D. C.

Dr. James R. Shaw, chief, and Dr. J. O. Dean, assistant chief, Division of Indian Health, addressed the first meeting of this committee on April 29. Dr. Bertlyn Bosley, chief, nutrition section, Indian health program, was chairman of the meeting.

Personal.—Dr. Kenneth W. Chapman has been appointed associate director of the Clinical Center of the National Institutes of Health, Bethesda, Md. His previous assignment was with the National Institute of Mental Health, where he was consultant to state and community hospitals and health agencies on the medical problems of narcotic addiction. Dr. Chapman joined the Public Health Service in 1939.

DEATHS

Sigerist, Henry Ernest, formerly director of the Institute of the History of Medicine at Johns Hopkins University School of Medicine, Baltimore, died at his home in Pura, Switzerland, March 17, aged 65. Dr. Sigerist was born in Paris, France, April 7, 1891. He received his medical degree at the Universitat Zurich Medizinische Fakultat, Switzerland, in 1917 and during World War I was a medical officer in the Swiss Army. From 1921 to 1923 he served on the faculty of the University of Zurich as a lecturer and professor of the history of medicine. In 1925 he succeeded his teacher, the late Prof. Karl Sudhoff, as director of the Institute of the History of Medicine at the University of Leipzig, serving until 1932 when he came to the Johns Hopkins University School of Medicine in Baltimore succeeding Dr. William H. Welch as director of the Institute of the History of Medicine, serving until 1946 when he retired and became research associate in the history of medicine at Yale in New Haven, Conn. Dr. Sigerist had been named to Yale faculty under an unusual arrangement whereby he could live in Switzerland and engage in preparing a monumental eight-volume history of medicine. He traveled widely. He delivered the South African Universities lectures, the Messenger lectures at Cornell, and came to Yale in 1940 to deliver the annual Dwight Terry lectures. In 1944 he served as chairman of the Saskatchewan Health Services Survey Commission and advisor to the Health Survey and Development Commission of India. In 1943 he was a vice-president of the American Association for the Advancement of Science, and since 1938 was vice-president of the International Society for the History of Medicine. He was an honorary fellow of the Academy of Medicine of Mexico and the New York Academy of Medicine; member of the American Academy of Arts and Sciences, American Philosophy Society, Alpha Kappa Kappa, Delta Omega, and Alpha Omega Alpha. He was past-president and secretary of the American Association of the History of Medicine and of the Society of the History of Science. In 1933 he was awarded the Karl Sudhoff Medal and in 1950 the William H. Welch Medal of the American Association of the History of Medicine. He was the author of several books, and the editor of many volumes, reports, and bulletins of foreign universities, the founder and editor for 15 years of the *Bulletin of the History of Medicine,* and from 1943 to 1948 he was editor of the *American Review of Soviet Medicine.* He had been awarded the degrees of doctor, honoris causa, University of Madrid, doctor of literature from the University of the Witwatersrand, doctor of laws from Queens University, Kingston, Ont., and doctor of science from the University of London, England.

Hamilton, Charles Marshall ⊛ Nashville, Tenn.; born in Russellville, Ala., March 25, 1890; Vanderbilt University School of Medicine, Nashville, 1918; professor emeritus of clinical dermatology at his alma mater; formerly on the faculty of Meharry Medical College; specialist certified by the American Board of Radiology; past-president and treasurer of the Tennessee State Medical Association, serving as chairman of its board of trustees; past president of the Nashville Academy of Medicine and the Davidson County Medical Society; since 1949 member of the House of Delegates of the American Medical Association; member of the American Academy of Dermatology and Syphilology and the Radiological Society of North America; since 1953 a member of the board of hospital commissioners of Nashville; served on the staffs of the Nashville General Hospital and St. Thomas Hospital, where he was president of the medical staff since 1942; died April 25, aged 67, of a heart attack on Kentucky Lake, near Camden, while fishing with friends.

Durlacher, Stanley Henry, Miami, Fla.; born in New York City June 5, 1911; Yale University School of Medicine, New Haven, 1938; served on the faculty of his alma mater, Louisiana State University School of Medicine in New Orleans, and at Johns Hopkins in Baltimore; since 1956 Dade County medical examiner; at one time chief of the pathological section, Medical Division, Army Chemical Center, Md.; assistant medical examiner for Maryland from 1950 to 1952, when he became pathologist, coroner's office, Orleans Parish, La., serving until 1956; visiting pathologist at the Charity Hospital, New Orleans, from 1953 to 1956; certified by the National Board of Medical Examiners; fellow of the American Association of Pathologists and Bacteriologists and the College of American Pathologists; specializing in pathological anatomy, medical examiner's office, Jackson Memorial Hospital; died in St. Luke's Hospital, Chicago, March 19, aged 45, of subarachnoid hemorrhage, and essential hypertension.

Engler, Clarence William ⊛ Cleveland; born in Fremont, Ohio Aug. 1, 1895; Western Reserve University School of Medicine, Cleveland, 1919; specialist certified by the American Board of Otolaryngology; assistant clinical professor of otolaryngology at his alma mater; veteran of World War I; member of the American Academy of Ophthalmology and Otolaryngology, Cleveland Library Association, Academy of Medicine of Cleveland, American Laryngological Association, and the American Laryngological, Rhinological and Otological Society; president of the American Broncho-Esophagological Association; fellow of the American College of Surgeons; on the staffs of the Huron Road Hospital, East Cleveland, City Hospital, St. Luke's and Lutheran hospitals; until recently president of the staff of St. Vincent Charity Hospital, where he died Feb. 23, aged 61, of congestive cardiac disease.

Cohen, Ira ⊛ New York City; born in Long Branch, N. J., in 1887; Columbia University College of Physicians and Surgeons, New York City, 1911; member of

⊛ Indicates Member of the American Medical Association.

the founders group of the American Board of Surgery; specialist certified by the American Board of Neurological Surgery; member of the American Neurological Association of which he was at one time vice-president; fellow of the American College of Surgeons; served as member of the New York Academy of Medicine; served in the medical corps of the U. S. Army on the Mexican Border in 1915; a captain in the medical corps of the U. S. Army in France during World War I; served on the staffs of the Mount Sinai Hospital, where he was president of the medical board, from 1942 to 1945, Hospital for Joint Diseases, and the Montefiore Hospital; died in Stratford, Conn., March 8, aged 69, of leukemia and cancer.

Bonthius, Andrew ✦ Pasadena, Calif.; born in Chicago Nov. 27, 1880; Northwestern University Medical School, Chicago, 1909; emeritus professor of medicine at College of Medical Evangelists, Loma Linda and Los Angeles; specialist certified by the American Board of Internal Medicine; fellow of the American College of Physicians; at one time a medical missionary in China, and consular surgeon for the U. S. Public Health Service in Amoy, China; on the staff of the Los Angeles County Hospital; consultant, Collis P. and Howard Huntington Memorial Hospital; for three years medical examiner for the Selective Service during World War II; a director of the Chamber of Commerce; died Feb. 24, aged 76, of coronary occlusion.

Fritzell, Kenneth Edward ✦ Grand Forks, N. D.; born in Minneapolis Feb. 17, 1908; University of Minnesota Medical School, Minneapolis, 1931; certified by the National Board of Medical Examiners; specialist certified by the American Board of Surgery; fellow of the American College of Surgeons; past-president of the Grand Forks District Medical Association; associate professor of surgery, University of North Dakota School of Medicine; veteran of World War II; member of the staffs of St. Michael's Hospital and the Deaconess Hospital, where he was chief of staff from 1951 to 1954; surgeon for the Great Northern Railway; died in the Peter Bent Brigham Hospital, Boston, Feb. 19, aged 49, following an operation on the heart.

Wilson, Joseph G., Senior Surgeon, U. S. Public Health Service, retired, Beloit, Wis.; born June 23, 1874; University of Pennsylvania Department of Medicine, Philadelphia, 1898; service member of the American Medical Association; member of the American Psychiatric Association; associated with the U. S. Public Health Service from 1906 to July 1, 1938, when he retired; served as director of the division of hospitals and mental hygiene, state department of welfare in Kentucky; formerly connected with the National Committee for Mental Hygiene in making surveys of mental institutions in various parts of the United States; died in the Beloit Hospital Feb. 5, aged 82, of bronchopneumonia and coronary sclerosis.

Sturgeon, John Dawson Sr., Uniontown, Pa.; born in Uniontown, July 12, 1854; College of Physicians and Surgeons, Baltimore, 1880; an associate member of the American Medical Association; the Fayette County Medical Society, of which he was for one term president and for 20 years assistant secretary, dedicated the June, 1954, issue of its publication, the *Fayette County Mirror,* in honor of his 100th birthday anniversary; at one time county coroner; a member of the city's first board of health; for some time U. S. pension examiner; one of the founders and charter member of the staff of the Uniontown Hospital; died Feb. 15, aged 102, of pneumonia.

Collins, William James ✦ Northampton, Mass.; Harvard Medical School, Boston, 1898; decorated by Gen. John J. Pershing during World War I for "exceptionally meritorious and conspicuous service" in France where he served as division surgeon and chief medical officer for the 76th Division of the American Expeditionary Forces; awarded the Purple Heart; during World War II did recruiting work for the Army, Navy, and Marines; on the staff of the Cooley Dickinson Hospital, where he died March 1, aged 80, of cerebral hemorrhage and arteriosclerotic heart disease.

Crosby, Leonard Green ✦ Denver; born in New Auburn, Minn., Jan. 26, 1873; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1899; specialist certified by the American Board of Radiology; member of the Radiological Society of North America and the American College of Radiology; past-president of the Rocky Mountain Radiological Society; veteran of World War I; on the staffs of Colorado General, Denver General, Mercy, and St. Luke's hospitals, and St. Joseph's Hospital, where he died Feb. 17, aged 84, of cerebral hemorrhage.

Dodd, Verne Adams ✦ Lantana, Fla.; born in Waterville, Ohio, Feb. 21, 1881; Ohio Medical University, Columbus, 1903; member of the Ohio State Medical Association; fellow of the American College of Surgeons; past-president of the Columbus Academy of Medicine; veteran of World War I; emeritus professor of surgery at the Ohio State University College of Medicine in Columbus; the Ohio State University presented him with the honorary degree of LL.D.; formerly chief of staff of the Ohio State University Hospital in Columbus, where he died Feb. 22, aged 76, of cancer.

Duval, Douglas Forrest, Colonel, U. S. Army, retired, Annapolis, Md.; born June 4, 1870; University of Virginia Department of Medicine, Charlottesville, 1894; commissioned a captain in the medical corps, regular Army, in 1903; among other places, served at the U. S. Military Academy, West Point, Philippine Islands, Hawaii, Cuba and the Mexican border; during World War I, was commanding officer of Evacuation Hospital, number 11, France; member of the American Medical Association and fellow of the American College of Surgeons; died in the Anne Arundel General Hospital Jan. 16, aged 86, of peritonitis.

Gerstley, Jesse Robert ✦ Chicago; Rush Medical College, Chicago, 1909; specialist certified by the American Board of Pediatrics; member of the American Academy of Pediatrics; past-president of the Chicago Pediatric Society; at one time member of the board of governors of the Institute of Medicine of Chicago; member of the Alpha Omega Alpha honor fraternity;

veteran of World War I; served as associate in pediatrics at Northwestern University Medical School; past-president of the medical staff at the Michael Reese Hospital, where he was chairman of the pediatric department; died March 16, aged 70.

Schmitt, Lionel Samuel, San Francisco; University of California School of Medicine, San Francisco, 1901; an associate member of the American Medical Association; associate professor of preventive medicine emeritus at the University of California School of Medicine, where he served as acting dean; formerly director of hospitals, University of California Hospital; a member of the California Academy of Sciences and the California Academy of Medicine; veteran of World War I; died in St. Francis Memorial Hospital Feb. 5, aged 79, of carcinoma of the colon and coronary arterial insufficiency.

Smythe, Frank Ward ✠ Memphis, Tenn.; born in Kosciusko, Miss., Nov. 18, 1891; University of Tennessee College of Medicine, Memphis, 1917; associate professor of surgery at the University of Tennessee College of Medicine; member of the founders group of the American Board of Surgery; member of the Southern Surgical Association, Central Association of Obstetricians and Gynecologists, and Southeastern Surgical Congress; fellow of the American College of Surgeons; veteran of World War I; on the staffs of the John Gaston Hospital and Baptist Memorial Hospital; died Jan. 26, aged 65.

Pinkley, Virgil Milo, San Bernardino, Calif.; born in Geneva, Nebr. in 1884; Vanderbilt University School of Medicine, Nashville, Tenn., 1908; served as deputy health officer and later as superintendent of the San Bernardino County Hospital, retiring in 1951; at one time associated with the Indian Service; for four years president of the board of trustees of the city school; San Bernardino Valley College gave him its first annual award for meritorious service in the cause of education and civic progress; died Feb. 12, aged 72, of acute myocardial infarction.

Randall, Samuel Bunker ✠ Santa Cruz, Calif.; University of California School of Medicine, San Francisco, 1925; certified by the National Board of Medical Examiners; fellow of the American College of Surgeons; secretary of the Santa Cruz County Medical Society; veteran of World War I; a member of the city board of education from 1937 to 1955 and president of the school trustees from 1951 to 1955; on the staffs of Santa Cruz and Sisters hospitals; died Feb. 1, aged 58, of carcinoma of the stomach with metastasis.

Dinnen, James Frank, St. Petersburg, Fla.; Indiana University School of Medicine, Indianapolis, 1908; served as vice-president of the American Association of Railway Surgeons; from 1927 to 1943 chief surgeon for the Erie Railroad; formerly assistant chief surgeon for the Nickel Plate Road and supervising surgeon for the Chesapeake and Ohio Railroad; for many years consulting surgeon at St. John's Hospital and on the staffs of St. Luke's and Lutheran hospitals; died Feb. 18, aged 72.

Alliaume, Charles Edward, Utica, N. Y.; Hering Medical College, Chicago, 1895; an associate member of the American Medical Association; member of the American Radium Society; served on the staff of St. Luke's–Memorial Hospital Center; died Feb. 16, aged 83.

Allphin, Winfield Scott, Georgetown, Ky.; Hospital College of Medicine, Louisville, 1904; member of the Kentucky State Medical Association; president of the Scott County Medical Society; member and past-president of the Rotary Club; president of the First National Bank of Georgetown; on the staff of the John Graves Ford Memorial Hospital; died in St. Joseph's Hospital, Lexington, Feb. 17, aged 76, of a heart attack.

Anderton, Herbert Seth, San Diego, Calif.; University of Maryland School of Medicine, Baltimore, 1910; an associate member of the American Medical Association; veteran of World War I; on the staff of the Mercy Hospital; on the board of the San Diego Gas and Electric Company; died Feb. 15, aged 68, of coronary disease.

Atchley, Barney D., Everett, Wash.; Drake University College of Medicine, Des Moines, 1911; died Dec. 2, aged 77.

Atkinson, Curtis ✠ Wichita Falls, Texas; Jefferson Medical College of Philadelphia, 1900; veteran of World War I; past-president of the Wichita County Medical Society; died Feb. 16, aged 82.

Axelrad, John ✠ Farmingdale, N. Y.; Medizinische Fakultät der Universität, Vienna, Austria, 1924; formerly owner of the Lakeside Hospital in Copiague, where he died Feb. 21, aged 57, of coronary thrombosis.

Bailey, Donald Middlesex ✠ Gillett, Wis.; Hahnemann Medical College and Hospital of Philadelphia, 1941; interned at Morristown (N. J.) Memorial Hospital; veteran of World War II; on the staff of the Community Memorial Hospital in Oconto Falls; died in Montego Bay, Jamaica, British West Indies March 9, aged 42, of coronary thrombosis.

Baker, Benjamin Philo, Orlando, Fla.; Medical College of Virginia, Richmond, 1948; service member of the American Medical Association; interned at Lewis-Gale Hospital in Roanoke, Va., where he served a residency; captain and flight surgeon in the 321st Bomber Wing of the Strategic Air Command; died at the Pine Castle Air Base Feb. 11, aged 34.

Bell, Lewis Barclay ✠ Chicago; Northwestern University Medical School, Chicago, 1911; member of the American Academy of General Practice; formerly on the faculty of his alma mater, Rush Medical College, and the Chicago Medical School; on the staff of the Jackson Park Hospital; local surgeon for the Illinois Central Railroad; died March 24, aged 72, of myocardial infarction.

Bell, Walter Houston, Dozier, Ala.; University of Nashville (Tenn.) Medical Department, 1906; died in the Mizell Memorial Hospital, Opp, Feb. 19, aged 82, of myocarditis with decompensation.

Bernstein, Perry ✦ Providence, R. I.; Tufts College Medical School, Boston, 1924; on the staffs of the Roger Williams General Hospital and the Miriam Hospital, where he died Feb. 23, aged 58, of cerebral hemorrhage.

Blackley, Carl Alvan, Lockport, N. Y.; Hahnemann Medical College and Hospital of Philadelphia, 1896; served as city physician, health officer, and Lockport School District physician; died Feb. 19, aged 87.

Blais, Robert Ernest ✦ Amesbury, Mass.; Boston University School of Medicine, 1924; interned at the Lowell (Mass.) General Hospital; past-president of the North Essex Medical Society; veteran of World War II; for many years school physician; president of the medical staff of the Amesbury Hospital, where he died Feb. 21, aged 59, of carcinoma of the lung.

Blakeslee, Malcolm Rae ✦ Portland, Conn.; Syracuse University College of Medicine, 1925; member of the American Psychiatric Association; died in the Ellis Hospital, Schenectady, N. Y., Dec. 1, aged 56, of myocardial failure.

Boggs, David Alexander ✦ Wilkinsburg, Pa.; University of Pittsburgh School of Medicine, 1914; veteran of World War I; on the staff of Columbia Hospital; died in the Allegheny General Hospital, Pittsburgh, Feb. 28, aged 65, of postoperative anuria following replacement graft surgery for aortic aneurysm.

Boone, Cassius A. ✦ Louisville, Ky.; University of Louisville (Ky.) Medical Department, 1913; member of the American Society of Anesthesiologists; on the staffs of the Kentucky Baptist Hospital, St. Anthony Hospital, and Norton Memorial Infirmary; died in the Orange Memorial Hospital, Orlando, Fla., Feb. 27, aged 69, of myocardial infarction and coronary sclerosis.

Bradley, George Richard ✦ Jacksonville, Ill.; Barnes Medical College, St. Louis, 1897; member of the staff of Passavant Memorial Hospital, where he died Feb. 21, aged 87, of strangulated inguinal hernia and arteriosclerosis.

Bronsten, Irvin Cecil, Yonkers, N. Y.; University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore, 1926; an associate member of the American Medical Association; served on the staff of the Lying-In Hospital and the Montefiore Hospital, New York City, where he died March 4, aged 54, of coronary disease.

Burchfield, George Winston ✦ Maryville, Tenn.; Vanderbilt University School of Medicine, Nashville, 1917; specialist certified by the American Board of Otolaryngology; member of the American Academy of Ophthalmology and Otolaryngology; city commissioner; died in the Blount Memorial Hospital Feb. 26, aged 62, of cerebral hemorrhage.

Burket, Firm C., St. Petersburg, Fla.; Eclectic Medical College, Cincinnati, 1922; died Feb. 13, aged 65, of myocardial infarction.

Butts, Arthur Clarkson Jr., New York City; Columbia University College of Physicians and Surgeons, New York City, 1902; specialist certified by the American Board of Obstetrics and Gynecology; fellow of the American College of Surgeons; on the staff of the Fordham Hospital; died Feb. 22, aged 76.

Byers, Joy Cleveland, Glendale, Ariz.; Northwestern University Medical School, Chicago, 1920; died Feb. 18, aged 64, of a heart attack.

Carhart, Earl Clyde, Los Angeles; Jefferson Medical College of Philadelphia, 1905; served on the staffs of the Angelus, Los Angeles County, and the Presbyterian Hospital-Olmsted Memorial hospitals; died in Santa Monica (Calif.) Hospital March 3, aged 77, of arteriosclerosis, heart disease, and nephritis.

Carpenter, Burwell S. ✦ Fairfield, Ala.; Medical College of Alabama, Mobile, 1905; served as a member and president of the board of education; on the staff of the Lloyd Noland Hospital; died Feb. 17, aged 74, of mediastinal lymphoma.

Chesne, Irving Leonard ✦ Chicago; Loyola University School of Medicine, Chicago, 1919; member of the American Academy of General Practice; on the staffs of Belmont, Frank Cuneo, and Columbus hospitals; on the board of the Loyola University Alumni Association; died April 1, aged 68, of acute coronary occlusion.

Clancy, Arthur William ✦ Newburyport, Mass.; Georgetown University School of Medicine, Washington, D. C., 1929; veteran of World War II; on the staff of the Anna Jaques Hospital; died Feb. 24, aged 54, of a heart attack.

Clement, Mortimer Taliaferro, Lieut. Commander, U. S. Navy, retired, Charleston, S. C.; Medical College of South Carolina, Charleston, 1916; service member of the American Medical Association; joined the Navy in 1916 and retired in 1938; on the staff of the Roper Hospital; died Feb. 28, aged 66, of heart disease.

Cole, George Maynard ✦ Brawley, Calif.; College of Medical Evangelists, Loma Linda and Los Angeles, 1943; past-president and secretary of the Imperial County Medical Society; served as chief of staff, Pioneers Memorial Hospital; died Feb. 22, aged 54.

Collier, Thomas Read, Whitesburg, Ky.; University of Louisville (Ky.) Medical Department, 1917; member of the Kentucky State Medical Association; died Feb. 21, aged 66, of coronary occlusion.

Conneen, Lawrence Whelen ✦ Portland, Maine; Georgetown University School of Medicine, Washington, D. C., 1937; specialist certified by the American Board of Radiology; member of the American College of Radiology; on the staff of the Bath (Maine) Memorial Hospital, Brunswick (Maine) Hospital, and Mercy Hospital; died Feb. 7, aged 45.

Culver, Cyrus Whitney ✦ Washington, D. C.; McGill University Faculty of Medicine, Montreal, Quebec, Canada, 1910; veteran of World War I; on the staffs of Garfield Memorial and Doctors hospitals; died March 17, aged 71, of heart disease.

Darling, William Adelbert, Wilson, Okla.; College of Physicians and Surgeons, Dallas, Texas, 1905; died Feb. 13, aged 86, of arteriosclerosis.

Drury, Ray C., Chicago; Northwestern University Medical School, Chicago, 1923; fellow of the American College of Surgeons; on the staff of St. Anthony de Padua Hospital; died in the Augustana Hospital March 25, aged 60, of cancer of the colon.

Ebeling, Walter Wilford ✱ Mount Vernon, Wash.; University of Pennsylvania School of Medicine, Philadelphia, 1928; fellow of the American College of Surgeons; member of the American Academy of General Practice; veteran of World War II; died in the Swedish Hospital, Seattle, Feb. 17, aged 55.

Eckman, W. Guy, Covington, Ky.; Medical College of Ohio, Cincinnati, 1895; served as health officer of Covington; died in the William Booth Memorial Hospital Feb. 12, aged 82.

Falconer, Richard Craig, Berkeley, Calif.; Medical College of Ohio, Cincinnati, 1890; for many years practiced in Lexington, Ky., where he was on the staffs of St. Joseph and Good Samaritan hospitals; died Feb. 27, aged 89, of heart disease.

Fauley, Gordon Brown ✱ Chicago; Northwestern University Medical School, Chicago, 1930; veteran of World Wars I and II; on the staff of the Norwegian American Hospital, where he died March 29, aged 57.

Findley, William McCrea, Wilkinsburg, Pa.; Western Pennsylvania Medical College, Pittsburgh, 1904; an associate member of the American Medical Association; member of the American Academy of General Practice; died in the Columbia Hospital March 6, aged 76, of cancer.

Freece, Margaret A., Salina, Utah; Northwestern University Woman's Medical School, Chicago, 1897; for many years member of the school board; died in the Salina Hospital Feb. 19, aged 85, of cardiac decompensation.

Friedman, Peter Henry, New York City; Long Island College Hospital, Brooklyn, 1911; on the staff of the Lincoln Hospital; died in the Lenox Hill Hospital Feb. 26, aged 74.

Friedman, Townsend Baer ✱ Chicago; University of Chicago, The School of Medicine, 1933; instructor in medicine, Northwestern University Medical School; specialist certified by the American Board of Internal Medicine; member of the American Academy of Allergy and the American Psychosomatic Society; veteran of World War II; chairman of the department of Allergy, Children's Memorial Hospital and Michael Reese Hospital, where he died March 6, aged 51.

Fryer, Julius William, Hathorne, Mass.; Medizinische Fakultat der Universitat, Vienna, Austria, 1928; member of the Massachusetts Medical Society; fellow of the American Psychiatric Association; specialist certified by the American Board of Psychiatry and Neurology; on the staff of the Danvers State Hospital; died Feb. 13, aged 58.

Gardiner, Waldron Raymon Jr., San Francisco; University of California School of Medicine, San Francisco, 1948; on the staff of the Stanford University Hospital; died March 6, aged 35.

Goodman, James Dudley ✱ Elyria, Ohio; Ohio State University College of Medicine, Columbus, 1939; specialist certified by the American Board of Ophthalmology; member of the American Academy of Ophthalmology and Otolaryngology; on the staff of the Elyria Memorial Hospital where he died Feb. 14, aged 44, of polycystic kidney.

Hagan, John Ausman, Los Angeles; Starling Medical College, Columbus, 1901; died Feb. 20, aged 79, of hemiplegia and arteriosclerosis.

Park, James Howard Jr. ✱ Houston, Texas; Tulane University School of Medicine, New Orleans, 1916; clinical professor of pediatrics at the Baylor University College of Medicine; specialist certified by the American Board of Pediatrics; member of the American Academy of Pediatrics; fellow of the American College of Physicians; on the courtesy staff of the Methodist Hospital, where he died Feb. 6, aged 65.

Parker, John Livingston, Downey, Calif.; Jefferson Medical College of Philadelphia, 1906; past-president of the Imperial County Medical Society; for many years practiced in Brawley, where he was an honorary member of the Rotary Club, of which he was at one time a president; died Feb. 2, aged 80.

Peebles, Martha Jane, East Stroudsburg, Pa.; Woman's Medical College of the New York Infirmary for Women and Children, New York City, 1897; for many years practiced in Brooklyn, where she was on the staff of the Brooklyn Hospital; served in France during World War I; formerly director of the board of health of New York City; died in Allentown (Pa.) Hospital Jan. 23, aged 86, of arteriosclerosis.

Pitzman, Marsh ✱ St. Louis; Washington University School of Medicine, St. Louis, 1906; died in the Jewish Hospital Feb. 7, aged 74, of bronchiectasis and cor pulmonale.

Poling, James Bishop ✱ Lima, Ohio; Miami Medical College, Cincinnati, 1904; veteran of World War I; for many years city health commissioner; on the staffs of the Lima Memorial Hospital and St. Rita's Hospital, where he died Jan. 17, aged 79.

Pope, Jenkins M., Edisto Island, S. C.; Medical College of the State of South Carolina, Charleston, 1895; died in the New Roper Hospital, Charleston, Jan. 29, aged 84.

Powell, Elmer Alvin, North Baltimore, Ohio; Illinois Medical College, Chicago, 1902; veteran of World War I; for many years member and president of the city and county board of education; vice-president from 1917 to 1932 when he became president of the Hardy Banking Company in North Baltimore, serving until January 1956, when he became chairman of the board; died in the Community Hospital, Bowling Green, Feb. 12, aged 84.

Pressly, Edward Brewster, Sparta, Ill.; Medical College of Georgia, Augusta, 1950; served in the medical corps of the U. S. Army; formerly resident on the staff of St. Joseph's Hospital, Alton; died in St. Luke's Hospital, St. Louis, Dec. 12, aged 42.

FOREIGN LETTERS

ARGENTINA

Plethora of Medical Students.—The dictatorship suffered by Argentina for 12 years tended to increase the number of university students by political reasons, with an absolute disregard for the qualities or intellectual standards of the students entering the university. Three factors were decisive for this increase: (1) the entrance examination was abolished; (2) tuition was free; and (3) a high school diploma was not necessary for acceptance. In spite of this bad situation, immediately after the fall of the dictatorship, it was not possible in Buenos Aires in 1956 to have measures for the selection of medical students adopted, although this was done at the University of Cuyo, Mendoza. The total number of students in the seven medical schools of the country is 30,881, of whom 7,618 are first-year students. However, the medical school in Mendoza has only 106 freshmen, and these were selected by an entrance examination. Teaching was greatly improved in 1956, but because of the excessive number of students it is still difficult and unsatisfactory. This is why all the professors of the medical school in Buenos Aires have requested the immediate establishment of an entrance examination for the 1957 academic year. As a result, some demagogues have tried to provoke student resistance by means of strikes and public disorders. The total number of physicians in the country is over 25,500, or one for each 700 inhabitants. It has been calculated that by 1960 there will be 30,000, or one for each 650 inhabitants.

Poliomyelitis.—In 1956 there was a severe epidemic of poliomyelitis, with about 5,000 cases and a high mortality, especially in children under 2 years of age. Medical groups from the United States, France, Norway, Spain, and Germany came to Argentina and promoted modern methods of treatment of the disease. The Salk vaccine was given to more than 3 million children. In 1956, 1,608 cases were reported in January and February, but in the same period in 1957, only 203 cases were reported.

FRANCE

Pleuropulmonary Perforation.—At the meeting of the Medical Society of the Hospitals in Paris on Nov. 30, H. Brocard and co-workers reported that pleuropulmonary perforation occurred in 3 of 40 patients with severe tuberculosis treated by deltacortisone and antibiotics. They were 20, 34, and 38 years of age respectively. In two, the pleural exudate did not contain any bacilli, as the perforation did not start in a caseous tubercle. The speakers suggest giving hormonal treatment only to patients with recent exudative noncavitary lesions. They believe that the use of hormones prevents the pulmonary parenchyma from taking the place of the substances carried away through the liquefied caseous cavity.

Treatment of Intractable Pain.—In *Semaine des Hôpitaux* (Jan. 30, 1957), J. Sigwald and co-workers present the results of their treatment of intractable pain. They infiltrate the frontal lobe with procaine through a suborbital opening according to a technique of their own. The operation takes about 10 minutes for each side. It may be practiced in the ward. Of 20 such infiltrations, the results have been excellent in 7, fair in 10, and poor in 3. Although minor complications may occur, no psychic disturbance nor any alteration of personality has been observed after these infiltrations.

Coenzyme A in Chronic Arteritis.—At the meeting of the Medical Society of the Hospitals in Paris on Dec. 7, M. Perrault and F. Kirsch reported their results with coenzyme A in 20 patients with chronic arteritis refractory to any of the usual treatments. The new treatment failed in only two cases. They gave each patient two intramuscular or intravenous injections a week of 300 mcg. of coenzyme A and reduced the injected dose to 150 mcg. a week as soon as improvement was noted. The speakers believe that the excess of lactic acid, a toxic metabolite in the blood of patients with arteritis, is transformed by coenzyme A turned into glycogen in the muscles and the liver. On the other hand, this coenzyme favors the synthesis of acetylcholine, a vasodilator.

Benzopyrine in Cigarettes.—The *Bulletin de l'Association française pour l'étude du cancer* (no. 2, 1956) presents evidence that 3-4 benzopyrine is present in an extract of cigarette smoke. The authors set up an artificial smoker, allowing it to burn cigarettes while regulating the speed of combustion. They noticed that the substance extracted from the tars of the cigarette papers presents a spectrum identical to that of 3-4 benzopyrine. The burning of 100 cigarette papers yielded 3 mcg. of this product, but the burning of 100 cigarettes yielded only 1.2 mcg. This suggests that tobacco contains some substance having an inhibitory action on the formation of 3-4 benzopyrine. The authors have not yet been able to prove whether this compound is a carcinogen or only a very closely related derivative of a carcinogen.

INDIA

Constituents of Urine in Health and Disease.—Pain and Banerjee (*Indian Journal of Medical Research*, January, 1957) studied the total and nonprotein nitrogen, urea nitrogen, ammonia nitrogen, amino acid nitrogen, creatinine, creatine, and uric acid in 50 normal subjects, 25 patients with cirrhosis of liver, 25 with subacute nephritis, and 20 with hypertension. The normal subjects consumed 80 to 110 Gm. of pro-

The items in these letters are contributed by regular correspondents in the various foreign countries.

tein, with an average intake of 2,100 calories per day; patients with cirrhosis and subacute nephritis took 100 to 120 Gm. of protein with a 2,200-calorie diet; and hypertensive patients took 75 to 85 Gm. of protein with a 2,400-calorie diet. Twenty four–hour urine samples were collected from each patient for three consecutive days. Cirrhotic patients excreted more amino acid nitrogen and ammonia nitrogen and less of the other constituents than normal subjects. They also excreted creatine, which was absent in the urine of normal persons and other patients studied. Patients with subacute nephritis had albuminuria. They excreted more amino acid nitrogen, but the excretion of other constituents was greatly diminished. Hypertensive patients also had albuminuria. In their specimens all the nitrogenous constituents were low, possibly because of renal failure.

Nature of Union Between Chloramphenicol and Antibodies.—C. M. Rangam and co-workers (*Indian J. M. Sc.* **11**:1, 1957) reported that chloramphenicol has been found by some workers to lower the agglutinating titers of serums of patients with typhoid while others have observed contradictory results. It has been suggested that the lowering of the titers is due to a physical union between chloramphenicol and antibodies against Salmonella typhi. The authors, therefore, studied the nature of this union. They found that incubation of rabbit immune serum with chloramphenicol caused a decline in its antibody titer, which was restored to its former level by refrigeration. Alternate incubation and refrigeration with charcoal or a mixture of charcoal and chloramphenicol gave identical results. Progressively increasing quantities of chloramphenicol were demonstrable in the globulin fraction of the serums during the incubation phase and progressively diminishing quantities during the refrigeration phase. The authors' results pointed to a physical union between chloramphenicol and antibodies through adsorption.

Sarcoma of the Breast.—S. Kuruvilla (*Journal of Postgraduate Medicine*, January, 1957) reported a series of 30 patients with sarcoma of the breast. With adequate treatment, sarcoma has a better prognosis than carcinoma of the breast. The 30 patients were seen at the Tata Memorial Hospital, Bombay, during the years 1941 to 1955. In the same period there were 1,596 cases of carcinoma of the breast. The age of the patients with sarcoma ranged from 18 to 77 years, 18 being between 21 and 40 years. In all patients the presenting symptom was a lump in the breast. In six, there was a history of a previous operation for the disease. In one, there were six recurrences. Retraction of the nipple was present in one patient. Enlarged axillary lymph nodes were palpated in six patients. The duration of the symptoms varied from 1 month to 15 years. Histologically, fibrosarcoma was the commonest form of sarcoma; the other forms were cystosarcoma phylloides, lymphosarcoma, carcinosarcoma, and myosarcoma. In both fibrosarcoma and cystosarcoma phylloides there is often a history of a long-standing tumor that has suddenly started growing rapidly. Such a history was present in all the three cases of malignant cystosarcoma. Three of the four lymphosarcomas were seen in young patients. In one patient there were lumps in both breasts and a mass in the hypogastrium. Later she developed a generalized involvement of lymph nodes and subcutaneous nodules. All three cases of carcinosarcomas were of less than four months' duration when first seen. The carcinomatous and sarcomatous elements in the primary tumor were mixed, but metastases in lymph nodes showed only the carcinomatous element. One patient had bilateral lumps, one being a carcinosarcoma and the other a fibroadenoma. Metastasis to regional lymph nodes is rare in sarcomas of the breast, with the exception of carcinosarcoma and lymphosarcoma. Lymph node involvement in fibrosarcoma indicates a grave prognosis. Metastasis to bones was seen in three patients with fibrosarcoma and to the lungs in one with fibrosarcoma and in one with carcinosarcoma.

Central Council of Health.—At the meeting of the Central Council of Health held at Ranchi in December, the Union Minister of Health said that good progress had been made in many fields and some notable developments had taken place. The targets laid down for nursing and ancillary personnel can be reached by intensifying the training program to overcome the shortage. The centrally aided training schemes for the training of health visitors and auxiliary nurse-midwives, which started in the first Five-Year Plan, are to be continued in the second Five-Year Plan. Special attention is necessary for the orientation of the workers on the village level in the fundamentals of public health and environmental sanitation. The village-level worker is in day-to-day touch with the people and has been especially trained in the proper approach to the people in order to seek their acceptance of new ideas and skills for the improvement of health and prevention of disease. Malaria control has progressed satisfactorily. Fortunately no resistance to insecticides has so far been reported in vectors, and as it usually takes a few years for such resistance to develop, an all-out effort will be made to completely eradicate malaria within the next few years. The mass BCG campaign made excellent progress until April, 1955, but it has bogged down since then because of the unsatisfactory conditions of service for the BCG staff and inadequate publicity. Other tuberculosis control measures included in the second Five-Year Plan are, however, being developed. The main features of this program, in addition to a BCG campaign, include (1) establishment of 300 fully equipped tuberculosis clinics; (2) establishment of 12 tuberculosis demonstration and training centers in association with medical colleges; (3) provision of 4,000 beds in different parts of the country; (4) establishment of a rehabilitation and aftercare center in association with large clinics; and (5) research work in collaboration with the Indian Council of Medical Research.

Although leprosy control has been slow, mainly because of the scarcity of suitably trained personnel, both medical and paramedical, of the 40 pilot project centers envisioned under the scheme, treatment and study centers and 30 subsidiary centers have been

established. A central leprosy teaching and research institute has been established in Tirumani, Madras. Health education is assuming increasing importance. A short training course for health educators has been instituted at the All-India Institute of Hygiene and Public Health, Calcutta. Arrangements are now almost complete for introducing an advanced course for health education specialists. A family planning research and program committee has been set up to make recommendations to the government. Two thousand family-planning clinics are to be opened in rural areas during the second Five-Year Plan period in association with primary health units. At each urban and rural clinic contraceptives will be distributed free of charge.

NORWAY

Prof. Carl Müller.—On the occasion of Prof. Carl Müller's 70th birthday last November his former and present collaborators joined in publishing a commemorative volume composed of original articles chiefly concerned with cardiovascular diseases. This volume is published as a supplement to *Acta medica scandinavica*. All the 17 articles are in English. The volume opens with a brief appreciation of Müller as teacher, research worker, and physician. As a teacher he has been a constant source of inspiration to his pupils and assistants, and as a research worker he has a well-earned international reputation based, among other things, on his study of hereditary xanthomatosis (Harbitz-Müller's disease) and its relation to coronary disease.

Penicillin Risks.—Dr. O. K. Harlem (*Tidsskrift for den norske Lægeforening*, Feb. 15, 1957) sent an elaborate questionnaire to 1,215 persons who had been patients in the hospital or in a private medical practice or were employees in one of two industrial concerns. They were asked if they had been given penicillin and, if so, in what way; if the penicillin treatment had been adequate; and how frequent and how intense certain complications had been. Of these persons, 621 had been given penicillin. This represented 67% of the 194 hospital patients but only 46% of the 325 employees in industrial concerns. Only 16 persons, or 1.3%, had had complications after penicillin treatment, and among them there were only 7 whose complications (urticarial reactions) could be regarded as definitely allergic reactions due to penicillin. This brings the penicillin risk down to 0.6%. Only in two patients had the reaction necessitated discontinuance of the treatment. In 86% the penicillin had been given by injection, in 10% by mouth, and in only 4% in the form of local applications (ointments, drops, inhalations). The comparative immunity enjoyed by the 621 persons given penicillin may partly be traced to the rarity with which penicillin was given as a local application, a procedure of which the author disapproves. A classification of the persons according to age suggests that when penicillin treatment has been in use longer nearly all of the community will have become "penicillinized." Only about half the persons given penicillin had received it for four days or longer, and those who had been treated for a shorter time could hardly have been given adequate treatment. Several of the recipients of penicillin had been given it on inadequate indications. Harlem compares his penicillin allergy rate of 0.6% with those of several American observers whose estimates of the penicillin complication rate have ranged from 5% to 15%.

Norwegian Aid for Underdeveloped Countries.—Between 1950 and 1955, Norway put 75 experts in various sciences at the disposal of the United Nations. A brochure issued by the Norwegian United Nations' Union gives an account of the work of seven of these experts in six countries. One of them, Dr. J. Kvittingen, became a consultant for the combined international-national health project in Addis Ababa, Ethiopia. Working at the venereal disease polyclinic and laboratory in Addis Ababa, he had to get along without fully qualified assistants most of the time. He came to the conclusion that the widespread dissemination of syphilis constituted the greatest health problem in Ethiopia. After the spring of 1955, excellent assistance was obtained from American-trained Ethiopian health educators, and many of the patients learned how important it is to bring the person from whom they had got their infection to the polyclinic. In 1954, there were no fully qualified Ethiopian physicians in the country, and the few foreign physicians were a very mixed lot. Without exception, the physicians attached to the various missions did excellent work. While the Norwegian mission was stationed south of Addis Ababa, the Swedish mission was stationed to the west of the capital. The medical officers of these two missions were most active, and the work they got through was impressive. Among the private practitioners were many Italians who had remained in the country after the occupation.

SWEDEN

Hypophysectomy for Malignant Disease.—At the Serafimer Hospital in Stockholm, Professor Olivecrona and co-workers continue to operate on the pituitary body with a view to the cure, or at least the arrest, of malignant disease, particularly cancer of the breast. Their latest observations (*Nordisk medicin*, Jan. 24, 1957) concern a series of 75 patients. In addition to 55 women and 2 men with cancer of the breast, there were 10 men with cancer of the prostate. The remaining patients had a variety of malignant tumors. In 5 of the 10 men with prostatic tumors, arrest or remission of the disease was noted. Two of those with remission had previously undergone other endocrine treatment without benefit. A remission could be claimed in 54% of the patients with cancers of the breast. Almost the same percentage (56%) has been claimed by other surgeons operating on the pituitary body for malignant disease. This remission rate of at least 50% may be higher than that of any other endocrine method of treatment, but Olivecrona does not therefore jump to the conclusion that hypophysectomy is necessarily superior to other methods. In six patients with remission, the hypophysectomy was certainly incomplete. Metastasis to the brain and extensive metastasis to the

liver may possibly be contraindications to this operation as well as ages over 60 years. The mean duration of the remissions effected in the women with metastatic breast cancer was about 17 months. Remissions could be claimed for both the men suffering from metastatic breast cancer.

Chancroid.—Chancroid continues to be essentially a seaman's venereal disease imported from abroad. Its frequency has fallen to such an extent that it is now rare. In the 10-year period 1946 to 1955, only 491 such cases were reported in the whole of Sweden. A series of 260 patients, 14 of whom were women, was studied by Björnberg and Krook (*Svenska läkartidningen*, Feb. 1, 1957). Most of the 246 male patients were seamen, and while most of them had been infected in foreign ports, all the women had been infected in Sweden. Several of the patients had had, or still suffered from, some other venereal disease, and as many as 36 also suffered from recent syphilis. Gonorrhea was also a common complication, as were scabies and pediculosis pubis. None of the 36 patients suffering also from recent syphilis had been treated with penicillin before coming to the hospital. On the other hand, there was not one case of recent syphilis among the 37 patients who had been treated with penicillin before hospital admission. In all the 37 patients, the chancroid had shown no sign of improvement with the penicillin treatment given on board ship without the benefits of an accurate medical diagnosis. Although the broad-spectrum antibiotics are undoubtedly effective against chancroid, it may be well to avoid them as they may mask a simultaneous syphilitic infection. The authors are well pleased with the sulfonamide treatment of chancroid, and they combine oral therapy with sulfonamides with local sulfonamide applications. Such treatment, persisted in for three to seven days, may be relied on to cure practically every case. The concomitant bubos yield to injections of penicillin, which does not, however, seem to have a definitely therapeutic effect on the soft chancre itself.

New Mode of Intoxication.—In September, 1955, the admission to the hospital of an emergency case of what was thought to be acute alcoholism in a 13-year-old boy led to the discovery of a rather widespread vice in boys of school age. Altogether 32 schoolboys were examined. Of these, 27 underwent sternal puncture and others underwent electroencephalography while under the influence of inhalations of "thinner," a solution much in use in the painting industry as a cleaning and solvent agent. An analysis of this solution showed that it contains ethyl and butyl acetate, ethyl and butyl alcohol, toluene, and probably some benzine. Reporting on these cases in *Svenska läkartidningen* for Jan. 4, Christiansson and Karlsson express grave concern over the psychiatric, sociological, and toxicological problems raised. Among the 32 boys, 18 had been addicted to this vice for at least six months, and there were some who had indulged in it for about five years. "Thinner" is dripped on a pad of absorbent cotton or a pocket handkerchief which is pressed against nose and mouth and then inhaled. The "thinner" is also inhaled as a spray directed against the lining of the nose and mouth. A sense of intoxication soon follows, and complete unconsciousness may occur. In 10 of the cases examined by sternal puncture, reactive changes were found in both the protoplasm and the nuclei of the blood cells, the former showing increased granulation and the latter alterations in the arrangement of chromatin. The electroencephalographic changes indicated cerebral stimulation, and it is doubtful if all the changes effected by prolonged indulgence in this vice are reversible. There is also the risk of addiction to it. This vice, known by the boys as "sniffing," is a serious matter requiring prophylactic measures, but, considering how useful "thinner" is in the painting world, it may be difficult to have restrictions imposed on its sale.

UNITED KINGDOM

Mass Radiography.—During the winter of 1955-1956, the mass radiography service of the Liverpool Regional Hospital Board carried out an intensive survey in the district of Bootle. Wide publicity was given to the scheme through the local newspapers, cinemas, leaflets, talks, loudspeakers, and door-to-door canvassing. The attendance of nearly all of the eligible school children was the most encouraging feature. The results (*Lancet*, Jan. 19, 1957) revealed that of 22,340 persons examined, 52 needed immediate treatment for tuberculosis and 580 had lesions that needed further study. Twelve cases of carcinoma, 98 of bronchiectasis, and 332 of cardiac abnormalities were also discovered. These results indicate the value of this method of case finding.

Nursing Homes.—The 1955 report of the health officer for London shows that there has been a steady decrease in the number of nursing homes from 170 in 1937 to 48 in 1955. Rising costs have been the main factor. Accommodation charges, which, before World War II, ranged from $14 to $24 a week, in 1955 ranged from $30 to $70 a week. The number of inmates in nursing homes dropped from 3,167 in 1947 to 1,091 in 1952. Fewer operations are performed in these homes and more of the beds have been used for medical cases, the chronically sick, and senile patients. Establishments where the aged are cared for fill a real need. Since in many staff positions a practical rather than a trained nurse will suffice, the smaller nursing homes might well turn their attention to the care of nonsurgical elderly patients.

Vagal Resection for Duodenal Ulcer.—Although vagal resection for the treatment of duodenal ulcer has not been generally accepted in this country, A. A. MacKelvie in the *British Medical Journal* of Feb. 9 presented an analysis of 473 consecutive cases so treated; 76% of the patients had received medical treatment for the condition as outpatients and 19% while in the hospital. Symptoms had been present for more than five years in at least half of the patients, and 33% had had either a perforation or noteworthy hemorrhage. The operation was performed through the abdominal wall after the left lobe of the liver had been mobilized. The esophagus was mobilized, at least 5 cm. of each vagus nerve was resected, and any residual twigs of

the nerves carefully sought. Of 118 patients on whom this operation was performed, in 28% the results were poor due to the need for later performing a gastroenterostomy to relieve gastric retention and such other symptoms as flatulence and diarrhea. In view of this fact, in 332 patients the vagal resection was combined with gastroenterostomy, and an excellent result, with a mortality of only 2%, was obtained in over 90% of these patients. A similar excellent result was obtained in 19 patients in whom vagal resection was combined with pyloroplasty, but vagal crush as a sole procedure in four patients produced no benefit. The author believes that vagal resection with a combined gastroenterostomy or pyloroplasty is the method of choice in the treatment of duodenal ulcers.

Traumatic Rupture of Extrahepatic Bile Ducts.—John A. McCredie *(British Medical Journal*, Feb. 2, 1957) reported two cases of damage to the extrahepatic bile ducts in young children. In each case the damage was the result of a traffic accident. The lesion was not recognized at laparotomy. In one patient a biliary fistula was present for three weeks, and in the other biliary ascites required frequent aspiration. In both patients spontaneous healing took place. Roentgenographic investigations, with the use of iodipamide sodium as the contrast medium, revealed a normal biliary tree, and as a result of this experience the author suggests that attempts to repair recently traumatized extrahepatic ducts may increase the likelihood of stenosis. In such cases, simple abdominal drainage and possibly cholecystostomy is all that is required.

Car Design.—In 1954 traffic accidents accounted for 5,010 deaths in Great Britain. William Gissane, *(British Medical Journal*, Feb. 16, 1957) states that this compares favorably with figures from Germany, France, and Italy, whose populations are less than that of Great Britain. The figures for these countries were 11,565, 7,539, and 5,281 respectively. Although many factors may account for this difference, Gissane postulates that the popularity of small, low, lightweight cars in these countries may be a factor. With the return of gasoline rationing in Great Britain, these small cars are becoming increasingly popular. This is to be deplored from the safety angle. The author advocates the solid construction of body work with good design, incorporation of a good length of steel between the driver and anything he might hit, safe design of steering wheel, shatterproof glass, and a car high enough to give the driver a good view of the road. He bases his views on many years of hospital experience and believes that the saving on gasoline may have been bought at too high a price.

Treatment of Periarteritis Nodosa with Cortisone.—A committee appointed by the Medical Research Council to investigate the effect of cortisone on the course of periarteritis nodosa reported (*Brit. M. J.* 1:608, 1957) that as the prognosis of the disease is so grave, it is considered unethical and impracticable to have a treated and a control series. A retrospective series of control patients treated before the introduction of cortisone was used for comparison. The diagnosis in all patients admitted to the trial was proved by means of biopsy specimens. Treatment, with a dosage of 200 mg. daily by mouth for a week, was started as soon as a positive diagnosis was made, or before, in the case of seriously ill patients. This daily dosage was raised 100 mg. each week until full suppression of the disease was obtained, or until the side-effects became intolerable. Once suppression occurred an attempt was made to reduce the dosage to a maintenance level. In patients with hypertension, which materially affects the prognosis, special care was taken if the blood urea level was over 60 mg. per 100 ml. or the diastolic blood pressure was over 110 mm. Hg. Strict comparison between the treated patients and the controls was not possible because of the much higher incidence of hypertension in the control group. When the patients with hypertension were included in the comparison, the results indicated that cortisone produced quicker relief of symptoms and suppression of signs in the treated group. When the hypertensive patients were not included, the difference in the treated and untreated patients was small, but statistically in favor of the cortisone-treated patients. The securing of a sustained suppression of outward manifestations of periarteritis nodosa required such large dosage of cortisone in some patients that troublesome side-effects were produced.

Penicillin in the Treatment of Breast Abscess.—De Jode *(Lancet* 1:560, 1957) reports that the advent of antibiotics has not diminished the number of cases of breast abscess treated in hospital. Of 68 consecutive cases seen at the London Hospital, Micrococcus pyogenes was grown in cultures from 64. When childbirth had taken place in the hospital, 90% of the cultured micrococci were penicillin-resistant, whereas the figure dropped to 71% in those cases where birth had occurred at home. Of 100 consecutive cases of breast abscess, 68 were lactational and 32 non-lactational. Penicillin alone or with other antibiotics was used in 44 of the laboratory cases, other antibiotics alone in 4, and in the remainder of the cases no antibiotic was used. When the organism in the abscess was penicillin-resistant, both the number of surgical incisions required and the healing time were increased in comparison with that in the cases in which no penicillin was given. The masking of signs of inflammation may lead to serious delay in instituting drainage, with the result that an excessive amount of breast tissue is destroyed, amounting in some cases to a functional mastectomy.

A further consequence of this destruction of breast tissue is the increased liability to further breast abscesses, particularly after later pregnancies. Use of penicillin should be restricted to early cases of acute mastitis, and then only when the mother has not been delivered in hospital and there is therefore a reasonable chance of dealing with an organism sensitive to penicillin. If there is no response in 48 hours, the use of penicillin should be discontinued. Care should be taken to see that the patient is kept under supervision to ensure that the condition is cured and not merely masked. When an abscess has formed, early and effective drainage is the surest way of obtaining early healing.

CORRESPONDENCE

METHYLATED STEROIDS AND JAUNDICE

To the Editor:—Orally given methyltestosterone has been used in clinical practice since its introduction by Foss in 1939 (*Brit. M. J.* **2**:11, 1939) both for its anabolic and for its androgen effects. It was not until 1947 that Werner (*Am. J. Med.* **3**:52, 1947) suggested that its use might rarely be associated with jaundice. Other reports followed (Kinsell, L. W.: *Gastroenterology* **11**:672, 1948; Werner, S. C.; Hanger, F. M.; and Kritzler, R. A.: *Am. J. Med.* **8**:325, 1950; Wood, J. C.: *J. A. M. A.* **150**:1484-1486 [Dec. 13] 1952; Van Dommelen, C. K. V., and Van der Steur, J. C.: *Nederl. tijdschr. geneesk.* **99**:2732, 1955; Brick, I. B., and Kyle, L. H.: *New England J. Med.* **246**:176, 1952). According to Werner and co-workers (ibid.) the whole picture of jaundice associated with methyltestosterone seems to be due to bile stasis. Biopsy showed dilated bile canaliculi in the central zones plugged with masses of bile pigment, and there was very mild hepatic cell damage in these central areas. The cephalin-flocculation reaction was negative, the serum alkaline phosphatase level only moderately elevated, and the serum bilirubin value increased. Although jaundice may be protracted, recovery is complete; in three patients who had recovered, renewed administration of this methylated compound only reproduced jaundice in one and, furthermore, as Gordon (Yearbook of Endocrinology, 1955-1956 Series, Chicago, Yearbook Publishers, Inc., 1956) states, "One reason for doubting the causative role of methyltestosterone is that the icterus is reported to disappear spontaneously, even when administration of the compound is continued." He had not seen a case after considerable experience with this substance.

Since testosterone has not been so implicated, some pharmaceutical literature has given this as a reason for discontinuing use of methyltestosterone in favor of tablets of testosterone for sublingual or sublabial use. Though testosterone when given orally is ineffective owing to deactivation by the liver, the makers and others claim that, given by the sublabial route, it is as effective as parenterally administered esters. Methyltestosterone, on the other hand, is effective when swallowed and when absorbed sublabially, although it is slightly more efficient by the latter route (Foss, G. L.: *J. Endocrinol.* **13**:269, 1956). The metabolism of these two substances is apparently different in that methyltestosterone increases creatinuria and does not increase the 17-ketosteroid value.

In a fairly extensive use of methyltestosterone with doses ranging from 5 to 150 mg. daily over prolonged periods up to 10 years, it so happens that we have only encountered one possible case of jaundice which might have been attributed to methyltestosterone therapy. Since for practice purposes it would be a pity to omit the use of methyltestosterone, unless its association with jaundice were shown to be a direct sequence and not merely coincidental, we felt we should try to ascertain whether any other physicians have noted jaundice associated with this therapy. After letters to *Lancet* (**1**:1020, 1956) and the *British Medical Journal* (**2**:1426, 1956) on similar lines, we have received information about a further 10 cases in Britain and the Commonwealth in which there appeared to the observer to be an association between the taking of methyltestosterone and the appearance of jaundice, although in many of these cases there seemed to be good evidence that hepatic disease in some form was present before methyltestosterone was taken.

We are venturing to submit this letter to THE JOURNAL to give us the opportunity of learning from its readers either in a published letter or private communication of any cases they may have encountered in their practice, whether the jaundice had any special characteristics, and whether this was direct proof or probability of cause and effect. Since commencing this investigation it seems to us that the enquiry should be extended to other methylated steroids such as methylandrostenediol, methylandrostanolone, methyl-9 α-fluorohydrocortisone and 9 α-fluoro-11 β-hydroxy-17 α-methyltestosterone.

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BREAST CARCINOMA AND TRIETHYLENETHIOPHOSPHORAMIDE

To the Editor:—An article by Bateman and Carlton (THE JOURNAL, Oct. 20, 1956, page 701) on the use of triethylenethiophosphoramide (thio-TEPA) presents data suggesting that this drug has unusual properties in controlling primary and disseminated carcinoma of the breast. These authors maintain it is of special value when injected directly into the tumor site, although claims are also made of good effects on cerebral, osseous, and pulmonary metastases after systemic administration.

Conclusions as to the value of any therapeutic procedure in patients with disseminated cancer of the breast are usually fraught with error because of the variability of the natural course of the disease, variations in the selection and size of clinical samples, and the difficulty in measuring objective regression of the disease. Even when undisputed tumor regression does occur, it is necessary to determine if regression is due to the agent under investigation or to ancillary therapy, or even to late effects of previous treatment. It seems apparent in the article cited that other modalities, notably irradiation, were employed concurrently with triethylenethiophosphoramide. The definition of "improvement" is not clear in this article, but one obtains

the impression that, if any lesion regressed during therapy, that constituted improvement by their criteria, irrespective of the course of other tumor metastases. A safer definition of tumor regression is that selected by the Subcommittee on Breast and Genital Cancer of the Committee on Research of the American Medical Association: "regression of major lesions without progression of any lesion or development of new lesions."

It is logical to expect local tumor regression at the site of injection of any caustic, cytotoxic, or sclerosing agent, but the value of such treatment in carcinoma of the breast is very limited. Isolated troublesome lesions usually can best be treated by irradiation or surgery. Although triethylenethiophosphoramide is useful when injected into the pleural space for the control of neoplastic disease effusions, it does not appear to be superior to nitrogen mustard or radioactive gold. Others who have used this drug do not agree that it is "notable" for its lack of side-effects, and serious bone marrow depression has been repeatedly reported.

At the present time it is the consensus of those working in the field of cancer chemotherapy that triethylenethiophosphoramide is of no more value than other alkylating agents. All these agents have been disappointing from the point of view of generalized tumor suppression in cancer of the breast, and their usefulness in this disease is probably limited to the control of effusions complicating metastatic disease.

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PROTECTIVE COATING FOR PLASTER CASTS

To the Editor:—During the course of routine fracture care in a large clinic one is impressed with the high rate of destruction of plaster casts, especially by children. A good number of the casts disintegrate under the strain of the writings, carvings, and washings to which they are subject. The frequent wettings of casts during the routine of living reduce many to the point where they resemble a soft rubber bandage. Not infrequently, reapplication of casts is required. More rarely, position of fractures is lost by failure of weakened plaster to maintain immobilization.

It has been found that the external spraying of casts with Krylon plastic reduces these problems. This Dupont plastic spray is dispensed in pressure cans and may be purchased at most paint or hardware stores for about $1.50. The spray may be applied immediately without waiting for the cast to dry. One or two light applications have usually been sufficient. No irritation of skin has been noticed.

Approximately 75 casts have been treated by external spraying with Krylon plastic. The life span of the cast was definitely increased; in fact it was found that the cast could frequently be made lighter due to the added hardness of the finish. Dirt and grime may be removed by wiping with a damp cloth. The glass-like surface resisted all but the most determined autograph artists. An ordinary dousing with water in no way weakened the plaster.

If the operator be in the mood for frivolity, casts may be coated in pink, blue, or any other color that might delight the patient's fancy. Indeed, there have been several occasions when the use of this modality has helped in gaining rapport with a difficult child.

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SUBSCRIPTIONS FOR ABROAD

To the Editor:—I have recently received the various publications of the A.M.A. through arrangement with the Christian Medical Society, and I wish to express my deep appreciation of this wonderful help. Patients come from many miles to be treated by "the American doctor." In a way we are representing the whole medical profession in America to these people. For we are all that they see of American medicine at work. If we fail, American medicine has failed in their eyes.

I am in charge of a small mission hospital in village India. Villagers look to us for the final help when all other help has failed. They will not go a long way to another hospital for consultation. If we can not help them, they usually go back to their village to die; hence versatility and a broad knowledge of medicine and surgery are of vital importance. The publications you are sending are an immense help.

Our financial resources are very limited, and our Indian doctor's is even more limited. May I say that the literature vacuum is one of the biggest problems to the progress of medicine in backward areas. It is comforting to know that you at home are interested in doing all you can to help in this and many other ways as we serve God and our fellow men in this remote and backward area.

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MISCELLANY

AMERICAN COLLEGE OF PHYSICIANS MEETING

The keynote of the annual meeting of the American College of Physicians in Boston in April was sounded by Dr. Walter L. Palmer, its president, who said that he did not believe that medicine was moving too fast but that many patients are expecting too much of it. Modern drugs have made a valuable contribution to the practice of medicine, but to call them miracle drugs is to create a false concept in the minds of the public. The most important things in medicine are still to discover the pathogenesis of the many diseases for which this is unknown or imperfectly known and to increase the accuracy of diagnosing the patient's condition. Greater attention should be paid to the

information obtainable through the physical examination. G. E. Schreiner deplored the fact that many a physician today either does not have a microscope in his office or does not use it to examine the patient's blood and urine. Many diagnoses would be made months or years earlier to the great benefit of the patient if such examinations were made routinely in office practice. Henry I. Russek warned that in the physician's zeal to use new and powerful drugs he must be sure that the cure is not worse than the disease. For example, a fine balance must be struck between the amount of an anticoagulant drug necessary to prevent thrombosis and the amount that will produce bleeding. The risk involved is justified when treating the more serious cases, but these powerful drugs are all too often given to patients with mild attacks and in whom the prognosis for recovery is excellent. The giving of the drug only subjects such patients to a needless risk. Robert P. McCombs pursued this theme from another angle. Persons who rush to take every new drug that is announced lay themselves open to serious drug reactions. It is estimated that such reactions are 10 times as common as they were just after World War II. No new drug should be taken without medical supervision, and the physician who prescribes it should be alert to detect untoward signs that may be the result of treatment.

Immunity.—At a panel on factors influencing resistance to infection, it was agreed that the wonder is not that people get sick but that in an environment teeming with many kinds of infectious agents so many stay well. In some cases heredity is a factor in resistance to disease. Resistance to infection may be weakened by a variety of causes. Infection with one organism may open the door to a host of secondary invaders. Pregnancy, industrial poisons, ionizing radiations, splenectomy, and diabetes mellitus are some of the other factors reducing resistance. Charles A. Janeway said that chicken pox, usually one of the most harmless of the childhood infections, may end fatally in a child who has been taking large doses of cortisone or related preparations.

Coronary Heart Disease.—David P. Barr said that coronary heart disease depends on three factors: heredity, sex hormones, and the amount of fat in the diet. These factors control the distribution and concentration of the blood lipids that lead to coronary thrombosis. The first cannot be controlled, but an understanding of the changes induced in the serum lipid spectrum by gonadal steroid administration may be useful in evaluating the greater vulnerability of men than women to coronary atherosclerosis, according to R. H. Furman and R. P. Howard. Ancel Keys stated that the theory that the diet, and especially its fat content, is important in the genesis of coronary heart disease is supported by recent experimental and epidemiologic studies. Fatty meals accelerate blood coagulation and inhibit fibrinolysis. Extensive experiments on men on controlled diets show effects on serum cholesterol concentration that prove to be predictable from knowledge of the amounts and kinds of fats fed. Attempts to show participation of dietary protein in the effects of dietary fats on cholesterol are negative. The serum cholesterol differences between populations do not depend on differences in obesity or physical activity between those populations. Studies on Japanese men in Japan, Hawaii, and California reveal, as predicted, a striking parallelism between the proportion of fat in the diet, concentration of cholesterol in the blood, and the frequency of severe atherosclerosis and coronary heart disease. The serum cholesterol differences produced in dietary experiments on man and observed in population comparisons are usually, if not always, due to beta-lipoprotein cholesterol.

New Antidiabetic Drug.—R. P. Bradley and L. P. Krall reported on the oral use of a nonsulfonamide preparation that they called DBI that has the advantages over carbutamide that it is nontoxic and is of some benefit to young as well as old diabetics. It lowers the blood sugar level, and its only untoward side-effect appears to be nausea. The daily dose is only 250 mg. Among the advantages of oral treatment for diabetes is the fact that some people who need treatment do not have the intelligence necessary to give themselves sterile injections of insulin.

Tuberculosis.—Irving Kass stated that, since the advent of effective antimicrobial therapy, the internist is more frequently faced with the responsibility of initiating or continuing the therapy in patients ill with tuberculosis. Unless the physician uses the antimicrobials properly, he can precipitate the emergence of resistance to the medicaments used. Once resistance has been established, no matter how intense the subsequent therapy, sputum conversion to negativity is rarely achieved. The following technique constitutes effective therapy: Since isoniazid (INH) is most effective on multiplying organisms, bed rest, unless the patient's condition is toxic, is not required. Similarly, collapse therapy is not used in patients who retain drug sensitivity. The most effective drug therapy is administration of a combination of streptomycin for 90 days and isoniazid daily for 18 months. This scheme does not result in the emergence of resistance and if the condition is initially sensitive to the medicaments, treatment failure does not occur. There is no standard dosage of isoniazid. Patients vary in their ability to metabolize isoniazid; thus all patients should, prior to therapy with this drug, have a microbiological assay. About 50% of the patients are rapid inactivators; and effective isoniazid therapy is achieved only when aminosalicylic acid (PAS) is added to the regimen. Aminosalicylic acid competes with the isoniazid for the latter's acetylating mechanism and permits a higher effective isoniazid blood level. Thus effective isoniazid dosage varies and should be determined by the results of the microbiological assay. J. L. Badger said that, although fewer patients are dying of tuberculosis, the number of active cases, many of them unattended by a physician, is increasing and the relapse rate has not declined. Although treatment with modern drugs brings about recovery without complications in 80 to 85% of patients, the cause of failure in the remaining 15 to 20% presents an urgent problem. The speaker blamed home-care schemes for most of the failures. Another factor is mistaking nocardiosis, which does not respond to antituberculosis drugs, for tuberculosis.

MEDICAL LITERATURE ABSTRACTS

INTERNAL MEDICINE

A More Direct Liquefaction of Bronchial Secretion by Aerosol Therapy. E. R. Levine. Dis. Chest 31:155-168 (Feb.) 1957 [Chicago].

Bronchial secretion often presents the most difficult problem in the management of bronchopulmonary disease. It is necessary to eliminate this secretion in order to maintain a free airway, but irritation must be avoided. Aerosol therapy has become an important aid in the liquefaction of viscous secretion. The author evaluates 4 different classes of aerosols and shows that in bronchopulmonary disease an aerosol is needed that contains a liquid, a detergent, and a mucolytic chemical and that, moreover, is nonirritating to a normal bronchus. Aerosols containing enzymes are not advisable because their use entails risks. After careful investigation an aerosol solution was prepared that is referred to as Aerosol Solution No. 2. It contains 0.125% of the detergent Tergitol 08 (sodium 2-hexylethylsulfate) and 0.1% of potassium iodide in sterile water.

This aerosol was administered to 96 patients with severe chronic or acute coughs and with thick tenacious, viscid, mucopurulent bronchial secretion. One characteristic that all these had in common was a spasmodic type of cough that produced noticeable dyspnea and, in some cases, actual cyanosis. In all of them, a wheeze was audible and rhonchi and sibilant rales were obvious in the chest before treatment had started. All of these patient had previously received broad-spectrum antibiotics for from 5 days to 2 weeks. Potassium iodide had been administered by mouth for from 3 to 4 weeks in 50% of the cases, with only a moderate amount of improvement. Several types of nebulizers were used. The routine was 4 treatment periods of one half hour each daily. The volume of aerosol used daily varied from 12 to 25 cc. Sixty of the 96 patients were over 40 years of age and 6 were children under 10 years of age. Treatment was continued for from 1 week to 6 months. Almost all claimed some improvement immediately after the first inhalation, but there was no objective evidence of decreased viscosity or ease of expectoration until approximately 24 hours after therapy was started. At the end of the first week of therapy, the sputum was definitely more liquid, and it expectorated easily without spasms of coughing in all of the patients treated. No irritation of mucous membranes or toxicity was noted. Clinical results were excellent in 66 and good in 30 patients.

The Climate Factor in Perennial Respiratory Allergy and Its Relation to House Dust Sensitivity. D. Ordman. Internat. Arch. Allergy 9:129-145 (No. 3-4) 1956 (In English) [Basel, Switzerland].

During studies on allergic patients in various parts of the Union of South Africa, the concept of "climatic respiratory allergy" emerged. It was found that some allergic patients who are in fairly good condition while they are inland show more or less severe allergic symptoms when they live in coastal regions. Pollens, fungi, and other exogenic allergens could be excluded as causal factors in many of these patients, and it is suggested that the development of symptoms while the patients are in coastal regions is due to the combination of high temperature and high relative humidity. The question is raised whether in patients with "climatic" respiratory allergy the climate as such exerts a physiological effect or whether the combination of high temperature and high relative humidity renders potential sensitizing substances, such as house dust, more highly allergenic. The allergenic potency of house dust collected at the coast was compared with that collected inland by the "threshold-concentration" skin-testing method carried out on allergic patients. Coastal house dust was shown to be more highly allergenic than inland house dust. There are indications that patients in the group with "climatic" respiratory allergy are benefited by desensitization with extracts of coastal house dust.

Does Tuberculosis Protect Against Cancer? H. Grosse. Ztschr. ges. inn. Med. 12:25-30 (Jan. 1) 1957 (In German) [Leipzig, Germany].

Earlier observers were under the impression that tuberculosis protected the patient against cancer, but later the concurrence of tuberculosis and of carcinoma of the lungs was observed with increasing frequency. This was generally explained by the fact that, with better treatment, patients with tuberculosis more often reach the "cancer" age. According to some investigators the death rate of tuberculous patients even today is still 4.5 times higher than that of the general population. Thus malignant tumors should be only about one-fourth as frequent in autopsies on tuberculous patients as in controls of the same age. The 34,650 autopsy reports studied by the author revealed 3,115 cases of active tuberculosis and 7,511 cases of malignant tumors; 212 of the malignant tumors, including 58 pulmonary cancers, occurred in the patients with active tuberculosis.

The place of publication of the periodicals appears in brackets preceding each abstract.

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Further analysis of these autopsy reports revealed that the incidence of cancer in men without tuberculosis was 24% and in those with tuberculosis 12.5%, and for women the corresponding percentages were 25 and 9. These figures, however, do not prove a negative syntropy of cancer and tuberculosis. On the contrary, since cancers occurred only from 2 to 2.8 times less frequently rather than 4 times less frequently, there seems to be a latent positive syntropy between the two diseases. Thoracic malignant tumors concur with tuberculosis more frequently than do extrathoracic tumors, especially in men. Thus it seems that the local predispotion to malignat tumors is much more definitely influenced by tuberculosis than is the general predisposition to malignant tumors. The author concludes that tuberculosis and other infectious diseases do not protect a patient against cancer; the apparent protection is explained by earlier deaths.

Investigations on Connections Between Acquired Hemolytic Anemias, Classical Blood Groups, Rhesus Factor, Sex, and Age. V. B. Lal and P. Speiser. Blut 3:15-19 (Jan.) 1957 (In German) [Munich, Germany].

Ninety-seven patients with acquired hemolytic anemia verified serologically were studied with regard to the distribution of blood groups, Rh_0 factor, sex, age, and several serologic data. There were no great differences between the distributions in these 97 patients and the corresponding distributions in 10,000 persons in the general population that would indicate a dependence of acquired hemolytic anemias on the hereditary serologic characteristics: ABO, Rh_0, or sex. Clemens and Walsh had found in 1955 that, of 66 patients with acquired hemolytic anemia in Sydney, Australia, a much larger proportion were blood group O than could be expected from the blood-group distribution in the general population of Sydney. In the critical evaluation of this assumption the present authors gained the impression that if more exact mathematical rules are applied no correlation between blood group and acquired hemolytic anemia appears. Studies carried out by these authors likewise revealed no serologic differences between the idiopathic and symptomatic forms of this disease.

Cholelithiasis and Hypothyroidism. J. Warter and J.-P. Weill. Schweiz. med. Wchnschr. 87:101-105 (Feb. 2) 1957 (In French) [Basel, Switzerland].

For several years the authors had noted that signs of hypothyroidism existed in patients in whom cholelithiasis appeared at an early age. They present observations on 15 patients with myxedema or simple hypothyroidism who had cholelithiasis. The existence of gall stones was verified either roentgenologically or by surgical intervention. Nine of the patients had hepatic colic; 3 had slight jaundice and mild pains; and in the other 3 the condition was discovered when cholecystography was carried out because of hypothyroidism. Those with thyroid insufficiency presented varied findings, such as cutaneous signs, a typical facial expression, and mental slowness. The metabolic rate was less than −12 in 5 of the patients and between −2 and −8 in the other 10. The blood cholesterol level was ascertained in 12 of the patients. It was between 1.5 and 2 Gm. per 100 cc. in 3 of the patients, and between 2 and 2.75 Gm. in the other 9. The fixation of radioactive iodine was investigated in only 2 of the patients, and it was low in both of them. It is significant that 8 of the patients were between 20 and 40 years of age, whereas cholelithiasis is generally regarded as occurring later in life. The fact that the group included 3 young men is likewise significant. The 15 patients were observed in the course of 7 years, and in this same period 60 patients with hypothyroidism were observed, that is, 15 of 60 or 25% of patients with hypothyroidism had cholelithiasis. The 60 patients with hypothyroidism included 15 with definite myxedema and of these 5 (33%) had cholelithiasis.

Hypothyroidism is regarded as the primary condition. Disturbances in the evacuation of the gallbladder, in the metabolism of cholesterol, and in hepatic function and endocrine disturbances have been mentioned as possible pathogenic factors. The authors believe that hypotonia of the gallbladder, disturbances in the metabolism of cholesterol and of the bile salts, and the influence of hormonal regulation represent a constellation of factors that would favor the concurrence of cholelithiasis with hypothyroidism. Diagnostic errors will be avoided if cholecystography is performed whenever digestive disturbances appear in patients with hyperthyroidism or myxedema. With regard to therapy, the authors suggest that thyroxin might be used as an adjuvant in cholelithiasis and as a prophylactic in hypothyroid patients, in subjects with a hereditary predisposition to cholelithiasis, or in patients who have been subjected to cholecystostomy.

Prognosis of Chronic Renal Failure 25 Years Ago and To-Day. P. Effersøe. Acta med. scandinav. 156:449-454 (No. 6) 1957 (In English) [Stockholm].

Of 12 patients with chronic disease of the kidneys in the terminal phase (i. e., with a renal function below 20% for more than 6 months) who were reported on by Van Slyke and co-workers in 1930, 10 died within an observation period up to 67 months. Half of them died after 9 months. These data were compared with those in a series of 37 patients with chronic disease of the kidneys in the terminal phase who were followed up for a similar period of time between 1949 and 1955. Of the 37 patients, 18 died, and half of them were dead after 13 months. Of Van Slyke's patients half had died after having had less than 10% renal function for 4 months. Of the author's patients half had died after having had the same degree of renal impairment for 8 months. At the end of the observation period, only 2 of the 12 patients were alive as compared to 19 of the 37 patients. Of the 19 patients with less than 20% renal function, so far 7 have survived for 6 to 12 months, 6 for 12 to 18 months, and 6 for an average of 22 months. A comparison between the conditions 25 years ago and today, thus, shows that the survival time of patients with chronic renal disease in the terminal phase who died, the survival time of the living, and the ratio of those living at the

end of the observation period, all argue in favor of a better prognosis today than 25 years ago. It cannot be said whether the improved prognosis in these patients is due to the introduction of antibiotics, more extensive use of blood transfusions, improved electrolyte regulation, or better dietetic treatment.

Test of Adrenal Cortical Function by Administration of Corticotropin (ACTH). W. Appel. Ärztl. Wchnschr. 12:156-159 (Feb. 15) 1957 (In German) [Berlin].

The 17-hydroxycorticoid excretion in the urine of 6 patients with adrenal cortical hypofunction before and after the administration of corticotropin was compared with that in 40 persons with normal function of the adrenal cortex. Forty units of a repository preparation of corticotropin were given intramuscularly, and the urine was collected in 8-hour samples for 32 or 56 hours. Determination of the corticoid values in the urine was made according to Reddy's technique modified by Forsham. The excretion of the 17-hydroxycorticoids in the 24-hour urine specimens of patients with adrenal cortical hypofunction before the administration of corticotropin often did not differ from that of normal persons. The basic excretion of 17-hydrocorticoids, therefore, is not sufficient to exclude the presence of adrenal cortical hypofunction. After the stimulation of the adrenal cortex by the administration of corticotropin, the values of the 17-hydroxycorticoid excretion in normal persons and in patients with adrenal cortical hypofunction were found to be outside the simple range of variation of both groups. Reduced amounts of 17-hydroxycorticoids were detected in the urine of the patients with adrenal cortical hypofunction. Repeated administration of the corticotropin the next day did not cause an increase in the values of hydroxycorticoid excretion above 10 mg. per 24 hours in the patients with adrenal cortical hypofunction.

In patients who have been treated with cortisone, hydrocortisone, prednisone, or prednisolone for prolonged periods before they are subjected to the corticotropin test, this test should be made on 2 successive days, because the hydroxycorticoid excretion values may be of the adrenal-cortical-hypofunction type on the 1st day because of temporary weakening of the adrenocortical function and may reach normal values only after the 2nd test. Those who have been treated with cortisone previously should be given prednisone before the corticotropin test in order to prevent the influence of the decomposition products of the administered steroids on the hydroxycorticoid excretion in the urine.

The corticotropin test was performed on several patients with various forms of hyperfunction of the adrenal cortex. Results showed that hyperfunction of the adrenal cortex (Cushing's syndrome) as a result of adrenal hyperplasia may be suspected when the 17-hydroxycorticoid excretion in the urine increases after the administration of corticotropin to more than 40 mg. per 24 hours. Patients with diabetic mellitus and obese patients with Cushing's syndrome particularly responded to the corticotropin test with high values of 17-hydroxycorticoid excretion. Excessive values of 17-hydroxycorticoid excretion up to 128 mg. and of 17-ketosteroid excretion up to 107 mg. in the 24-hour urine specimen after administration of corticotropin were observed in a patient with moonface and values of 25 mg. for hydroxycorticoid excretion and 35 mg. for 17-ketosteroid excretion before the administration of corticotropin. A patient with a congenital adrenogenital syndrome treated for 2 months with daily doses of 100 mg. of cortisone had urinary levels of 12 or 14 mg. of 17-hydroxycorticoid and of 7.6 or 8.8 mg. of 17-ketosteroid before the administration of corticotropin and urinary levels of 24 mg. of 17-hydroxycorticoid and 20 mg. of 17-ketosteroid on the 2nd day of administration of corticotropin. The increase in the levels of 17-ketosteroid in this patient was much more pronounced than that in the levels of 17-hydroxycorticoids. The reported data confirm the great value of the corticotropin test in the diagnosis of adrenal cortical hypofunction and in the etiological differentiation of the various forms of hyperfunction of the adrenal cortex.

Periarteritis Nodosa: Four Cases. R. Armas Cruz, J. Harnecker, O. Gazmuri and others. Rev. méd. Chile 84:525-538 (Oct.) 1956 (In Spanish) [Santiago, Chile].

Periarteritis nodosa is a collagen disease characterized by arterial inflammation and fibrinoid degeneration. It is associated with nodular skin lesions, involvement of the visceral disorders of micturition and changes of the chemical constitution of the urine. The diagnosis is made by the presence of a febrile infection, accompanied by diffuse articular pain, acute abdominal disorders, renal disease with or without hypertension, and symptoms of polyneuritis. Allergic angiitis should be ruled out. As the disease progresses the arteries of the most important viscera become involved. The pulmonary arteries are spared, unless pulmonary hypertension or other pulmonary complication are present. Generally the disease follows a rapid course to a fatal end. Improvement of some of the symptoms has been reported from the use of corticotropin or cortisone, but this did not control the neurological symptoms. In several patients, recurrences occurred on discontinuation of hormone treatment and death occurred even if the patients had shown a favorable response to the treatment. Better results are reported from the use of prednisone and prednisolone. Four cases with typical symptoms are reported. The 1st patient died of cardiorenal insufficiency and pleuropneumonia. Autopsy showed involvement of the coronary, renal, pancreatic, intestinal, and subarachnoid arteries. The 2nd patient died of arterial thrombosis and purpura. Autopsy showed involvement of the heart, spleen, and kidneys. The 3rd patient had an abdominal form of the disease with obstructive jaundice. A biopsy specimen confirmed the diagnosis. When last seen the patient was in a remission and was taking cortisone. The 4th patient had pneumonia, a buccal abscess, suppurative sinusitis, and renal insufficiency. Autopsy showed it was involvement of the coronary, renal, and testicular arteries.

SURGERY

Complications After Operations for Esophageal Atresia. N. Urban. Ztschr. Kinderh. **79**:194-202 (No. 2) 1957 (In German) [Berlin].

Fifteen of 70 children who were operated on for esophageal atresia could be followed up for long periods. Unfortunately the life expectancy is favorable for only a certain percentage of these children, because in many the condition is inoperable and many have other deformities or die of aspiration pneumonia, which is a frequent complication of this operation. Other complications impairing the function of the esophagus operated on because of atresia may develop slowly and become evident only after a long time. The author lists the types of complications that may interfere with the oral intake of food, the further development of the esophagus, or may endanger the life of the child. Interference with the intake of food by a stricture in the region of the anastomosis resulting from shrinkage at the site of suture was the most frequent of the late complications. The food intake of these children becomes gradually more difficult. Aspiration of small quantities of food may eventually produce an aspiration pneumonia. The upper part of the esophagus may become dilated and even pouchlike; vomiting may increase; the pouch may spill over while the infant nurses or drinks, and, finally, the infant may retain a few swallows only when erect. In one patient with this complication bougienage proved effective.

Cicatricial distortion of the esophagus may result also from scars in the region of the mediastimum and the right lung, the esophagus may be pushed out of line, and diverticula may form. These conditions may also interfere with drinking. Suture insufficiency is the most dangerous of the late complications of operations for esophageal atresia; it threatens especially when the anastomosis is under tension, that is, if a large defect has to be bridged. Fistulas or pseudodiverticula to the mediastinum or to the lung may form and may cause pleurisy or refractory pneumonia. This complication caused 2 of the 4 deaths in this group of children. Foreign bodies may become lodged in the esophagus and may hinder the passage of food.

Experiences in Closed Surgical Correction of Interatrial Septal Defects. A. S. Traisman and H. S. Traisman. Quart. Bull. Northwestern Univ. M. School **31**:49-57 (No. 1) 1957 [Chicago].

The intracardiac location of interatrial septal defects has hampered attempts at closure. Both hypothermia and extracorporeal circulation techniques have been developed, with the treatment of interatrial septal defects among their specific objectives, but, since these techniques are still risky and also require prolonged preparation, the closed techniques for repair of interatrial septal defects are still being used at the Children's Memorial Hospital in Chicago. Three major closed methods for repairing interatrial septal defects are presented: the Gross technique of attaching a rubber well to an incision in the lateral wall of the right atrium, the Sondergaard technique of introducing a constricting suture along the rim of the interatrial septal defect, and the Lam technique of using a double-pointed needle to introduce sutures through the interatrial sulcus into the anterior rim of the interatrial septal defect.

In operations on 22 children, only the latter 2 closed methods were used. No occasion arose in the author's experience in which the well technique could not be replaced by one of the other 2 shorter methods. The Sondergaard method was used in 4 children and the Lam technique in 18. The Sondergaard technique was particularly applicable to small interatrial septal defects of the ostium secundum type. In the larger interatrial septal defects of this type, it is usually advisable to introduce several interrupted sutures in order to approximate the anterior and posterior walls of the defect without seriously narrowing the chamber of the left atrium. Of all the available techniques, the safest and most efficient method is that made possible by use of the double-pointed needle popularized by Lam. The author concludes that the closed methods leave a great deal to be desired and that some type of direct closure that can be done with accuracy and low mortality will probably supplant them.

Oesophageal Reconstruction in Children Using Intrathoracic Colon. C. D. Sherman Jr. and D. Waterston. Arch. Dis. Childhood **32**:11-16 (Feb.) 1957 [London].

Sherman and Waterston used 2 methods for esophageal reconstruction in children. The 1st was devised by Waterston and consists in transplantation of the transverse colon isoperistaltically into the left posterior part of the chest on a pedicle containing the left colic artery. The operation was performed 1st on an infant with atresia of the esophagus without tracheoesophageal fistula. The reconstruction required 4 operations, which were carried out over a period of about 9 months. About a month after the 4th operation the infant's stomach ruptured through a diaphragmatic opening. This hernia was repaired, and since then the child has continued to thrive and has developed normally. He eats everything and has no difficulty in swallowing. The method has the advantage of preserving intact the all important cardiac sphincter mechanism between the esophagus and the stomach. Two other babies in whom this technique was used for esophageal reconstruction are now 4 and 5 years of age respectively, and are both thriving. In a 4th child an attempt was made to combine stages 2 and 3 into one operation. The colonic loop was pulled up too tightly into the neck, thereby bowstringing the supplying artery. The colonic loop became gangrenous and the child died a few hours after operation.

In the second method of reconstruction the ascending colon is transplanted isoperistaltically in the retrosternal position. This method was developed by Sherman. In infants with esophageal atresia of tracheoesophageal fistula, it is wise to delay reconstruction. The cervical esophagus is brought out in the left side of the neck, and a gastrostomy is performed on the following day. At a later date, esophageal reconstruction is performed. A longitudinal incision extending to the xiphoid is made and the ascending colon mobi-

lized by cutting the lateral attachments. The length of the ascending colon is estimated, and the collateral vascular supply evaluated by placing a bull-dog clamp on the ileocolic artery. During the waiting period to ascertain whether the blood supply to the cecum is maintained, an appendectomy is performed. The ileum is sectioned from 4 to 6 in. proximal to the ileocecal valve. This leaves a segment of ileum that can be anastomosed to the cervical esophagus if it proves necessary. The transverse colon just to the left of the middle colic artery is sectioned, and, after the sectioning of the ileocolic vessels, the transplant can be swung to the neck, the blood supply then coming through the middle colic vessels. The transplant is carried through the substernal tunnel, which is cleared by blunt dissection in the anterior mediastinum. The reconstruction is terminated by end-to-end anastomosis of the cecum or ileum to the cervical esophagus, by anastomosis of the lower end of the transplant into the anterior wall of the stomach, and by end-to-end ileotransverse colostomy. The gastrostomy opening is left in place and may heal spontaneously or may be closed at a later date.

Studies of the colonic blood supply have shown that at times one or other of the above methods may be impracticable because of lack of collateral circulation. Other possibilities include (1) use of the transverse colon with the blood supply based on the middle colic and right superior colic vessels, (2) use of the transverse colon with the blood supply based on the middle colic and right superior colic vessels, (3) use of transverse colon with the blood supply based on the middle colic artery and left superior colic artery, (4) use of the descending colon with the blood supply based on the middle colic artery, (5) use of the cecum and terminal ileum with the blood supply based on the ileocolic artery, and (6) various methods of using the jejunum and stomach. Reconstruction of the esophagus by colon transplant is still in the developmental stage, but experience suggests that further trial and evaluation are worth while.

Treatment of Portal Hypertension in Children. P. Sandblom and C. Ekman. Arch. Dis. Childhood **32:** 61-64 (Feb.) 1957 [London].

Of 82 patients operated on because of hypertension, 33 were under 20 years of age. Splenoportography and measurement of the intrasplenic pressure proved useful in the establishment of a preoperative diagnosis in children and adults. The main indication for surgery was esophageal hemorrhage. The purpose of treatment was to reduce portal hypertension and, thereby, the tendency to esophageal hemorrhage by the establishment of a shunt between the portal and the caval systems. In childhood the block was most frequently extrahepatic, while intrahepatic block was usually seen in patients with hepatic cirrhosis between the ages of 40 and 60 years. An anastomosis was made in 7 of 8 patients with intrahepatic block; in the 8th only splenectomy was possible. Of the 7 patients 5 have been free of symptoms for from 1 to 7 years. The other 2 died 3 and 2 years after the operation. The patients with the extrahepatic block included 21 ranging in age from 2 to 20 years who previously had not undergone splenectomy. Eighteen of these were subjected to splenorenal anastomosis with suture. Nine of these remained symptom-free during a follow-up period of from 1 to 4 years, whereas hemorrhage recurred in the other 9 patients, 6 of whom died. Hemorrhages recurred also in the 2 patients in whom splenorenal anastomosis was established with the aid of a Vitallium tube, and 1 of these died. The 1 patient who was subjected to splenectomy also died.

Of 17 patients who had previously undergone splenectomy, 4 were subjected to anastomosis of small vessels and 2 to portacaval anastomosis. All 6 of these patients later had hemorrhage, and 2 of them died. Direct attack on the esophageal varices, i. e., intraesophageal division of varices or partial esophagogastrectomy gave more encouraging results, in that, of the 6 patients treated in this way, only 1 had a recurrence. Of 2 patients treated by mediastinal tamponage, 1 died and the other remained symptom-free. The 3 patients who were subjected to laparotomy or Talma's operation died. Only 6 of the 17 patients were symptom-free 1 year later. While the primary mortality rate was higher in the group with intrahepatic block, the tendency to recurrence was much higher in the group with extrahepatic block, especially in the subgroup of patients who had previously undergone splenectomy. A comparison of the results of portacaval anastomosis and splenorenal anastomosis in the entire series revealed that, after portacaval anastomosis, all of the 26 patients who survived were free from recurrences, while 13 of 33 survivors after splenorenal anastomosis had recurrences. The more favorable results of portacaval shunt can be explained by the fact that the lumen is larger, and, therefore, the operation involves less risk of occlusion than does splenorenal anastomosis.

Total Adrenalectomy for Malignant Hypertension. W. Van 'T. Hoff. Quart. J. Med. **26:**149-160 (Jan.) 1957 [Oxford, England].

If the presence of papilledema is taken as the criterion for the diagnosis of the malignant phase of hypertension, nearly 80% of the patients not treated die within a year of the diagnosis. Although there is no good evidence that adrenocortical hormones play an initiating role in essential hypertension, they do play a part in the maintenance of normal, and probably also of raised, blood pressure. Treatment of essential hypertension by partial adrenalectomy was first reported in 1934 by DeCourcy, who believed that the resulting improvement in 8 patients was due to removal of the adrenal medulla. Since the advent of replacement therapy, complete removal of the adrenals has been carried out in many patients, but in nearly all of them the operation was combined with some form of sympathectomy, which makes it difficult to assess the value of adrenalectomy alone.

The author studied the effect of adrenalectomy in 5 patients with malignant hypertension and good renal function. All were men, aged from 26 to 57, and before operation they had a mean resting diastolic blood pressure of 130 mm. Hg or more. Four patients had blurring of vision, and all 5 had papilledema, retinal hemorrhages, and exudates. One patient was admitted

to hospital with hematuria. None gave a history of angina pectoris or showed any evidence of left ventricular or congestive heart failure. After adrenalectomy all the patients were maintained on cortisone alone. They felt better, their headaches improved, and they were all allowed to return to work in 4 months. Papilledema, hemorrhages, and exudates improved in all, but none showed a significant reduction in blood pressure. When further attempts were made to lower the blood pressure by reducing either the cortisone dosage or the salt intake, the patients showed signs of hypoadrenalism before there was any reduction in blood pressure. While all the patients derived symptomatic benefit from adrenalectomy, there was no evidence that their lives were prolonged.

Observations on the Use of 5-Hydroxytryptamine in Surgery. L. Sala. Arch. sc. med. **81**:534-540 (Dec.) 1956 (In Italian) [Turin, Italy].

The administration of 5-hydroxytryptamine had a beneficial effect on 42 patients subjected to appendicectomy, 8 to gastroresection, 10 to hysterectomy, and 10 to cholecystectomy. All operations were performed under general anesthesia after premedication with morphine and atropine. A dose of from 5 to 10 mg. of the drug was injected intravenously, and, after a few seconds during which the respiration and blood pressure were controlled, narcosis was induced with pentothal and then the gas was administered. A 2nd dose of from 5 to 10 mg. of the drug was given to patients subjected to longer operations. Bleeding was reduced markedly. The best results were obtained in patients subjected to cholecystectomy or hysterectomy. The little blood that was lost was denser than the blood lost by patients to whom the drug had not been given.

The Clinical Control of Red Cell Loss in Burns. E. Topley and D. MacG. Jackson. J. Clin. Path. **10**:1-19 (Feb.) 1957 [London].

The development of anemia in badly burned patients has been attributed to bleeding granulations, blood loss at operation, and an impaired rate of red blood cell formation. Only recently has an unexplained internal disappearance of red blood cells been considered to play a major role. This raises such questions as "When does this destruction occur?," "How great is it?," and "How urgent is replacement?" The data presented were obtained in a series of 150 patients. In 86 patients the erythrocyte volume was studied. Discussing possible ways of assessing red blood cell loss, the authors admit that they are not sure that some degree of oligemia is harmful; conversely they are not sure that keeping the blood volume normal at the price of using more plasma and producing more edema is beneficial, but prevention of more than a 20% reduction in blood volume seems reasonable. Control of the blood volume must depend on serial erythrocyte volume and hematocrit measurements, if temporary oligemia is to be prevented. This is possible only in a unit that specializes in the treatment of burns. Massive red blood cell loss occurs most often in patients with extensive burns who have a chance of survival, and the prevention of oligemia in these patients is most rewarding. Routine blood transfusion and serial hemoglobin estimations are not indicated in patients with burns involving less than 10% of the body surface, especially in those with less than 2% of full-thickness skin loss. In patients with from 10 to 20% total area burned (usually from 2 to 10% full-thickness skin loss), early blood transfusion is probably unnecessary, but serial hemoglobin estimations every 2 or 3 days are indicated until less than 2% full-thickness skin loss remains unhealed. In patients with from 20 to 40% total area burned (usually 10 to 30% full-thickness skin loss) a blood transfusion equal to 20% of the patient's blood volume should be given in the first 12 hours and the hematocrit kept between 10 and 20% above normal for the patient's weight and height, assuming there is 0 to 10% red blood cell loss. A further 20% should be given in the next 36 hours if indicated clinically by oliguria, cold extremities, cyanosis, hemoglobinuria, or more than 2% microcytes in the head of a stained blood film on admission. Subsequently repeated hemoglobin tests are required. In patients with over 40% total area burned (usually over 30% full-thickness skin loss) 20% of the patient's blood volume should be given in the first 12 hours and the hematocrit kept at normal for the patient's height and weight, assuming 20% red blood cell loss. One should then be prepared to give a further blood transfusion equal to 20 to 60% of the patient's blood volume in the next 36 hours if indicated clinically. These are the patients in whom serial blood volume estimations are most valuable, provided the practical errors of such determinations are appreciated. Subsequently, repeated hemoglobin tests are required.

Elective Resection of the Colon for Diverticulitis. M. K. Bartlett and W. V. McDermott. M. Rec. & Ann. **51**:329-331 (Feb.) 1957 [Houston, Texas].

Elective one-stage resection of the sigmoid was performed on 43 (60%) of 71 patients with diverticulitis in the course of 3 years. Indications for elective resection consisted of an established pattern of recurrent attacks of acute diverticulitis, continuing symptoms of residual inflammation or of some degree of obstruction, persistent bleeding, the presence of a fistula, persistent urinary symptoms, and the suspicion of carcinoma. Two of the 43 patients died, 1 of peritonitis and 1 of a pulmonary embolus. Four other patients had complications, such as sepsis of the wound in 2 and atelectasis and pericarditis in one each. Three-stage resection was performed on 28 of the 71 patients. There were no operative deaths. The choice of a preliminary transverse colostomy was made in all of these patients because of the presence of a large inflammatory mass, frequently associated with perforation and abscess formation. Three patients died in the immediate postoperative period after a transverse colostomy for what proved to be acute diverticulitis and carcinoma of the sigmoid with perforation.

Diverticulosis of the colon is a relatively common condition, the diagnosis being established by barium enema or at autopsy. These diverticula are acquired lesions, usually multiple, and may occur anywhere in

the intraperitoneal colon but are most common in the sigmoid. The presence of an area of acute diverticulitis in the sigmoid produces the familiar clinical aspect of pain and tenderness in the lower part of the abdomen, nausea and vomiting, fever, and an elevated white blood cell count. Muscle spasm may be present in varying degrees, and a mass may be felt either by abdominal or bimanual examination. The acute attack may progress to perforation of an inflamed diverticulum. The perforation may erupt into the free peritoneal cavity with the development of spreading peritonitis, or a localized abscess may form that may occasionally result in a fistula either externally or into an adjacent organ. The morbidity associated with the major complications of diverticulitis and the prolonged hospitalization and invalidism attendant on multiple-stage operations have provided the stimulus for a more aggressive attitude toward the use of elective one-stage resection of the involved portion of the colon to forestall such complications. The inflamed area is usually of quite limited extent, even in a fairly acute phase of the disease, and even though diverticula may be present both above and below the inflammatory zone. This makes possible a relatively easy resection with normal intestinal wall available for suture both above and below the resected segment. The process seldom extends down to the pelvic floor and is usually confined to the free sigmoid loops. The operation is not without danger, and every effort must be made to be sure that the estimated risk of the disease is greater than that of the proposed treatment.

GYNECOLOGY & OBSTETRICS

A New Factor in Maternal Mortality. H. B. Turner. J. Kentucky M. A. **55**:133-136 (Feb.) 1957 [Louisville, Ky.].

Maternal deaths have declined 85% in the past 20 years. The principal causes had been sepsis, toxemia, and hemorrhage. Toxemia as obstetric killer is today in 1st place, but, while improvement is being made in one direction, a new difficulty appears from another. Anesthesia is the new killer, ranking 5th among the causes of maternal death. Data were collected from the state of Michigan for the years from 1950 to 1954. Thirty-four of the 515 maternal deaths were the direct or indirect result of anesthesia. These data were compared with those of the city of Memphis, Tenn., where, during the period 1946-1955, of 79 maternal deaths, 11 were caused by anesthesia. On the other hand, in the Baptist Memorial Hospital from 1947 to 1956, there were 22,086 live births. Of 11 maternal deaths in this series none were caused by anesthesia.

In most of the cases, anesthesia was regional, saddle block being the most common. In all instances, general anesthesia was induced by interns or residents giving nitrous oxide or ethylene for the spontaneous delivery of multiparas. Laryngospasm occasionally occurs, and the danger of aspiration of vomitus is always present. Efforts should be made to increase the number of well-trained anesthetists and to adequately distribute such personnel among all services requesting anesthesia. Local anesthesia should be used in poor-risk cases and in situations in which regional methods are contraindicated. Women have come to expect relief of the pains of childbirth. Successful labor and delivery can, however, occur without maternal medication of any kind. Few, if any, women ever died from the uncomplicated pains of childbirth.

Poliomyelitis in Pregnancy: A Report of 79 Cases in Connecticut. M. E. Rindge. New England J. Med. **256**:281-285 (Feb. 14) 1957 [Boston].

During the 5-year period 1951-1955, a total of 2,167 cases of poliomyeltis were reported to the Connecticut State Department of Health. Males predominated in the age groups under 15 and females in the age groups over 15 years. Females 15 years of age or over accounted for 456 of the cases reported, and, of these, 79 or 17.3% were known to have been pregnant when they became ill. This is much higher than the estimate given by Weinstein, Aycock, and Feemster that 7% of women aged from 20 to 40 years are pregnant at any given time, and agrees with the accepted idea that pregnant women are more susceptible than nonpregnant women to poliomyelitis. The danger of contracting poliomyelitis is apparently greatest in the 2nd trimester of pregnancy, the danger of loss of the fetus greatest in the 1st, and the danger of maternal mortality in the 3rd trimester. The Connecticut figures support the theory that there is a tendency for poliomyelitis to occur in the 1st trimester of pregnancy in women who are carrying a male fetus and in the 3rd trimester in those carrying a female fetus as well as the theory that some factor related to household contact with children or associated with the presence of children in the household may account for the increased incidence of poliomyelitis observed in pregnant women. It was also observed again that poliomyelitis in pregnancy, particularly in the early months of pregnancy, may lead to a general retardation in development of the infant.

DERMATOLOGY

Fractionation of 17-Ketosteroids in Patients with Exfoliative Dermatitis Following Long-Term Cortisone Therapy. T. Putkonen, S. Pesonen, K. Rehtijärvi and R. Kristoffersson. Acta dermat.-venereol. **36**:450-463 (No. 6) 1956 (In English) [Stockholm].

Corticotropin secretion and adrenocortical function are reduced during the prolonged administration of cortisone in patients with certain skin diseases. The authors studied the sudden interruption of hormone therapy in 3 men with chronic generalized exfoliative dermatitis who had been treated with cortisone, corticotropin, and hydrocortisone for 27 months, 26 months, and 11 months respectively. They had taken hydrocortisone only for the last 5 or 6 of these months. Fractionated determination of the 17-ketosteroids was carried out immediately before, during, and after the treatment-free period. The interruption of treatment was best tolerated by a 44-year-old man, whose maintenance dose was only 60 mg. of hydrocortisone,

whereas, in the other 2 (aged 54 and 29 years), whose maintenance doses were 120 and 220 mg., respectively, there was severe oozing of the skin lesions, loss of weight, and a decline in the plasma proteins. During hydrocortisone therapy the urinary excretion of 17-ketosteroids and of dehydroepiandrosterone was low in all 3 patients. Immediately after the suspension of treatment, the excretion of 17-ketosteroids increased gradually, but later it declined again.

The most rapid and greatest increase was observed in the patient with the lowest maintenance dose. He also showed the greatest increase in the excretion of the dehydroepiandrosterone originating in the adrenal cortex, indicating that his adrenocortical function improved most. The patient with the largest maintenance dose (the 29-year-old man) likewise showed an increased excretion of dehydroepiandrosterone during the suspension of treatment, but no increase was seen in the 54-year-old man, who showed the least tolerance for the cessation of hormone treatment presumably because the adrenocortical atrophy was farthest advanced in this patient. His excretion of metabolites of hydrocortisone (11-oxy-17-ketosteroids) also was much higher during treatment than during nontreatment, which was not the case in the other 2 patients. The excretion of 17-ketosteroids originating in the testes, namely androsterone and etiocholanolone, was low in all patients during hydrocortisone therapy. After discontinuation of hormone administration, the androsterone excretion increased but that of etiocholanolone decreased, the combined level of the two thus remaining practically unchanged. These observations point to a functional insufficiency of both the testes and the hypophysis.

Histology and Cytochemistry of Human Skin: X-Irradiation of the Scalp. W. Montagna and H. B. Chase. Am. J. Anat. **99**:415-445 (Nov.) 1956 [Philadelphia].

This report is concerned with changes that take place in the hair follicles during a period of 11 weeks after exposure to roentgen irradiation. Forty biopsy specimens of scalp were studied: 36 from white and Negro children from 5 to 9 years of age and 4 from adults. The responses to roentgen irradiation were identical in whites and Negroes and in the children and adults. The irradiation of hair follicles stops all mitosis in the cells of the matrix. These cells fragment and disappear during the 1st week. For 3 to 5 weeks after treatment, the lower half of each active follicle continues to degenerate, the hair drops out, and the entire follicle is reduced to a cord of cells. Damaged cells accumulate glycogen and lipid and lose their basophilia before they fragment. At the end of degeneration this cord is composed of the cells from the outer sheath in the upper half of the follicle and is comparable to a normal, quiescent follicle. The lower half of the follicle is dispensable and transient, and the upper half is the permanent part; from this are formed future generations of hair follicles.

While the bulb is degenerating and retreating upward, its base is never detached from the dermal papilla. During this time the dermal papilla loses its metachromasia, its stainability with the periodic acid–Schiff stain and its alkaline phosphatase activity. These properties are regained after 10 or 11 weeks, when the follicles are again growing normally. During the early period of follicle degeneration the cells of the dermal papilla engulf the melanin, lipids, and glycogen that are released by the degenerating cells of the bulb. These substances disappear after 4 weeks when large scale degeneration of the follicle has ceased. The dermal papilla, then, not only contains inductive substances that guide the growth and differentiation of hair follicles, but its cells also act as phagocytes. The vitreous membrane is a sensitive index of damage to hair follicles. Shortly after exposure to roentgen rays, it becomes thick and wrinkled and attains its maximum thickness after about 1 week. It remains very thick for 5 to 7 weeks until the follicle again becomes active. The membrane then becomes fragmented.

OPHTHALMOLOGY

Autokeratoplasty: Covering of Donor-Site with Lyophilized Human Cornea. B. Alberth. Ophthalmologica **133**:61-64 (Jan.) 1957 (In German) [Basel, Switzerland].

Autoplasty is the best solution for corneal transplantation, because the transparency of the transplant is not impaired by immunobiological processes. Several procedures are available for the disk-shaped autokeratoplasty. Transplantation of a disk of the clear cornea of a blind eye to the opacity of the other eye was performed in the 69-year-old patient whose history is presented. After a transparent corneal disk from the right, blind eye had been transplanted to the leukoma in the left eye, the defect of the donor site was covered by a slice of cornea obtained from a lyophilized human cornea. The authors had waited for an opportunity to use such material, and they believed that since the donor eye to be grafted was blind, the method could be tried. A human eye that had been preserved by the "adsorptive lyophilization" method of Bornemissza-Szilagyi and that had been kept in a sterile tube at room temperature for 152 days was taken out 30 minutes before the operation and was regenerated in isotonic sodium chloride solution at 37 C (98.6 F). A disk 5-mm. in diameter was trephined out of this eye and was placed over the defect in the right, blind eye of the patient. This corneal graft grew in but became cloudy, whereas the autotransplant remained transparent.

Neoplasms of the Notochord: Report of a Case of Basilar Chordoma with Nasal and Bilateral Orbital Involvement. C. D. Binkhorst, P. Schierbeek and G. J. W. Petten. Ophthalmologica **133**:12-22 (Jan.) 1957 (In English) [Basel, Switzerland].

The notochord is a column of cells formed in the central axis, ventrally from the neural tube. In vertebrates it is a transitory organ, its supporting function being taken over by the vertebrae developing around it, but vestiges of chordal tissue may remain and in these chordomas may develop. A 70-year-old woman with this rare form of tumor was seen because of nasal

obstruction and increasing frontal headaches. Her friends had observed her protruding eyes and a "polyp" showing in her right nostril. Twelve years previously she had completely lost her eyesight. At that time tumor of the hypophysis had been diagnosed, and a tumor dose of 2,000 r had been applied. Examination in 1955 revealed protrusion of both eyeballs with conspicuous lateral displacement. Between the medial angles of the eyes and the ridge of the nose a tumor mass was apparent, and from the right nostril a glassy mass of tissue protruded. Similar tissue was found in the left half of the nose, and the nasopharynx was also obstructed with it. These and other findings and the course of the process suggest a slow-growing neoplasm causing destruction of the base of the skull with invasion into the facial part of the skull. Intracranial growth had probably remained limited to the region of the optic chiasm. The glassy appearance of the tumor suggested chordoma.

In 3 sessions about 65 Gm. of the tumor mass was removed by the endonasal route. The patient felt much relieved after this; the patency of the nose was reestablished, and the headache disappeared. Five weeks later the right frontal and ethmoidal sinuses were widely opened. The floor of the frontal sinus and the frontal wall of the ethmoid proved to be missing. Another 50 Gm. of tissue was removed. The histological examination of the tissue confirmed the diagnosis of chordoma. The authors confine their discussion to chordomas originating in vestiges of the craniocervical notochord. In this area 6 points of origin exist, but ectopic localizations have been described in the mandible and in the frontal sinus. On studying the cases described in the literature, the authors found that the onset is fairly often characterized by a more or less typical neuroophthalmological syndrome, consisting of fronto-orbital headache, loss of visual acuity, limitation of the visual fields of 1 or both eyes, respectively, and paresis of the eye muscles. In cases of extracranial growth exophthalmos may occur, coupled with an early invasion into the nasal sinuses and the nasopharynx. The clinical differentiation from other tumors of the base of the skull may be difficult, particularly with respect to subtentorial foci, tumors of the pontine angle, tumors originating in the paranasal sinuses and the nasopharyx, and disorders near the optic chiasm. An important point in the differential diagnosis is the fact that basilar chordomas, with their strong tendency to extracranial growth, give rise to intracranial complications only at a late stage. The growth of a chordoma is nearly always slow, but, with respect to bone, it is particularly destructive. Therapy is usually palliative.

The Correction of Exophthalmos and Levator Spasm. R. E. Moran. Plast. & Reconstruct. Surg. 18:411-426 (Dec.) 1956 [Baltimore].

Dimmed vision, total blindness, or even death occurred in patients with malignant exophthalmos as late as 1931, when Naffziger relieved severe exophthalmos by decompression of the orbital contents into the anterior cranial fossa. While orbital decompression was a distinct advance, Naffziger's operation was a formidable one and a less radical approach seemed desirable. Dollinger in 1911 had used lateral decompression of the orbit successfully in a patient with malignant exophthalmos, and others had described techniques for decompression into the sinuses. The author together with the late Dr. Shugrue carried out experiments in the anatomic laboratory with the hope of finding a safer approach for decompression in patients with symptoms not severe enough to warrant the use of the formidable Naffziger technique. They worked out a simple technique for removing the lateral orbital wall (without disturbing the orbital rim), and opening the orbital fascia to permit decompression of its contents into the temporal and infratemporal fossae.

The author described this operation in 1937, and he has used it so far in 33 patients. Ten were under 30 years of age, 12 were between 30 and 40, and 11 were over 40. Decompression through the lateral wall of the orbit was performed bilaterally in 20 of the patients. There were 55 decompression operations on the 33 patients, with no deaths. In patients in whom the exophthalmos was stationary and levator spasm was absent at the time of operation, the drop in exophthalmos was more rapid and more striking than in those in whom the levator spasm was a postoperative factor and active disease was present in the orbit (as evidenced by conjunctival edema, etc., at the time of operation). In the former patients, the average drop in exophthalmos readings was 6 mm., whereas in the latter, the average drop was under 5 mm. When no levator spasm existed after decompression, the ocular muscles regained their tone more quickly, particularly in those with paresis of the superior rectus muscle. The edema and conjunctival irritation subsided more quickly when levator spasm was present. When levator spasm was marked in only 1 eye, the exophthalmos was usually more pronounced on that side. The levators were operated on as an adjunct to decompression in 12 patients and, bilaterally, in 9 patients. In 3 patients with unequal exophthalmos, only 1 eye was operated on. In 2 patients with unilateral exophthalmos, the levator was surgically weakened and no decompression was necessary. Because of a residual elevation of the temporal side of the lid, the first 4 patients were reoperated on with satisfactory results.

THERAPEUTICS

On the Use of Salts of Rare Earth Metals (Neodymium Combined with Praseodymium) for Prophylaxis of Thrombosis. W. Osten. Ärztl. Wchnschr. 12:107-112 (Feb. 1) 1957 (In German) [Berlin].

A series of 46 selected surgical patients was studied. Because of their constitution, the condition of their circulation, their age, and the operative trauma, they were considered to be threatened by thrombosis and were treated prophylactically with a 1% solution of a compound (Helodym 88) containing 65 to 70% of the neodymium salt and of 35 to 30% of the praseodymium salt of beta-acetylpropionic acid. The recommended initial dose for a patient weighing 154 lb. (70 kg.) with a normal (100%) thromboplastin time is 7 cc., that for

a patient with a thromboplastin time of 80% of normal 5.6 cc., and that for a patient with a thromboplastin time of 120% of normal 8.4 cc. of the 1% solution of Helodym 88. Additional doses depend on the values of prothrombin and proconvertin. A reduction to from 50 to 30% of the normal may be sufficient for prophylactic purposes. Slow intravenous administration appeared to prevent side-effects. Except in patients who underwent operations on the stomach, intestine, and thyroid and those who were subjected to operations associated with great loss of blood treatment was started from 6 to 10 hours after the operation or even before the operation. In the exceptional patients, treatment was started on the evening of the day of operation or on the morning of the 1st postoperative day. Treatment was continued for from 4 to 10 days. The duration of treatment is longer in older than in younger patients because of a greater tendency to develop thrombosis and longer postoperative rest in bed. Treatment should be discontinued gradually within 1 or 2 days, with reduced doses. Dose and duration of the treatment as given represent a general guide, but they must be adapted to the individual need depending on the tendency to bleed or clot. Treatment with Helodym 88 is contraindicated after neurosurgical operations, during pregnancy and menstruation, and in patients with a particular tendency to bleeding.

Thromboembolic accidents did not occur in any of the 46 patients who were treated with Helodym 88. The drug inactivates the prothrombin and proconvertin circulating in the blood by forming a complex of a_2-globulin (i. e., prothrombin plus proconvertin) with the rare earth metals. The effect of Helodym 88 can not be counteracted by giving vitamin K_1. Prolonged treatment with Helodym 88 causes blockade of the synthesis of prothrombin and proconvertin in the liver. Impairment of the hepatic parenchyma that was present before starting Helodym 88 treatment may become worse as a result of the treatment. The patients should be placed on a diet free of oxalates (rhubarb, gooseberries) to prevent renal damage in the course of the treatment with Helodym 88.

The Anticoagulant Effect of a New Coumarin Derivative—Sintrom (Geigy)—and Its Control by Standardized Clotting Time. G. A. Mayer and W. F. Connell. Canad. M. A. J. **76**:272-278 (Feb. 15) 1957 [Toronto].

Anticoagulant treatment with Sintrom, a new coumarin derivative, was given to 42 patients, 22 of whom had acute myocardial infarction, 12 acute coronary insufficiency, 3 pulmonary embolism, 4 peripheral thrombophlebitis, and 1 cerebral embolism. The patients were studied for a period of 866 treatment days. On 18 of these days heparin only was administered, for 128 days heparin and Sintrom were given concurrently, and for 720 days Sintrom was given alone. Sintrom was started on the 1st day with a dose of from 20 to 24 mg. On each of the following 3 days the dose was reduced by 4 mg., the total dose for the day being given at noon after food. Control of anticoagulant treatment was maintained with the aid of the standardized clotting time measured in unmodified venous blood immediately after withdrawal according to Mayer's method described in THE JOURNAL (161:806 [June 30] 1956).

The therapeutic aim, to keep the standardized clotting time between 15 and 20 minutes, was achieved in 71% of treatment days when Sintrom was the sole anticoagulant used. On 15% of treatment days the standardized clotting time was less than 15 minutes, on 12% it was between 21 and 25 minutes, and on 2% between 26 and 30 minutes. Sintrom produced a therapeutic prolongation of the standardized clotting time after an average induction period of 4.3 days. No hemorrhagic accidents or thromboembolic complications were noted when the standardized clotting time was maintained within the authors' desired range. When treatment with Sintrom was discontinued, the standardized clotting time returned to its pretreatment level within from 48 to 72 hours. Under the conditions of this study, Sintrom proved to be a satisfactory oral anticoagulant for short-term therapy. Sintrom therapy was adequately and easily controlled with the aid of the standardized clotting time. No significant correlation was found between the Quick one-stage prothrombin test and the standardized clotting time.

Phenylbutazone: Effects of Its Administration for Prolonged Periods. W. C. Kuzell, R. W. Schaffarzick, W. E. Naugler and B. M. Champlin. New England J. Med. **256**:388-392 (Feb. 28) 1957 [Boston].

Phenylbutazone was given for from 12 to 54 months to 34 men and 66 women with a variety of rheumatoid disorders, 73 of whom were in the 4th, 5th, and 6th decades of life. Not a single patient was previously satisfied with the relief afforded by the salicylates. All the patients initially had a favorable therapeutic response to phenylbutazone and freedom from untoward side-effects of the drug permitted its prolonged administration. The range of the daily dose of phenylbutazone varied between 100 and 600 mg. The usual daily dose was 300 or 400 mg. When the drug was given intramuscularly the daily amount varied from 0.6 to 1.0 Gm. for 2 or 3 days, followed by oral administration as described above.

Of the 100 patients, 60 had rheumatoid arthritis, 23 ankylosing spondylitis, 4 psoriasis with arthritis, and 13 mixed arthritis (rheumatoid arthritis and degenerative joint disease). Of the 60 patients with rheumatoid arthritis who received phenylbutazone for 54,180 patient-days, 53 had an initial grade 1 or 2 therapeutic response in accordance with the criteria of the American Rheumatic Association. In 46 of these 53 the favorable response was maintained for the duration of the treatment. All of 7 with a minor (grade 3) initial therapeutic response maintained the original degree of improvement. None of these 7 patients progressed to grade 1 or 2 regardless of duration of the treatment. Only 4 of the 60 patients discontinued treatment; 3 for various reasons, and the 4th died of hemorrhage from a duodenal ulcer while taking phenylbutazone and hydrocortisone concurrently. All the 23 patients with ankylosing spondylitis who received phenylbutazone for 16,650 patient-days obtained initial major

improvement that was maintained throughout the period of treatment. Two discontinued treatment, 1 because of nervousness and 1 because of peptic ulcer. The 4 patients with psoriasis and arthritis received the drug for 680 patient-days and had major improvement. The 13 patients with mixed arthritis received phenylbutazone for 9,360 patient-days; 11 achieved a major therapeutic response, which was maintained in 9. One of 2 who obtained only minor improvement continued to be improved at the end of the study.

One woman with rheumatoid arthritis had agranulocytosis after a severe upper respiratory infection after 16 months of treatment with the drug. Agranulocytosis occurred in another woman with mixed arthritis who had received phenylbutazone for 28 days and acetosulfone for 21 days concurrently. Both these women later were successfully treated with phenylbutazone for many months. Laboratory examinations performed on 50 of the 100 patients at the end of the study gave no evidence of hematological or hepatic damage attributable to prolonged treatment with phenylbutazone. The abnormalities in these laboratory determinations were those habitually found in patients with these rheumatic disorders. In 90 of the 100 patients, the original favorable response was maintained. Although phenylbutazone was occasionally withheld temporarily because of untoward side-effects, its administration was resumed successfully in all but 6 patients. As a rule, in patients with ankylosing spondylitis a greater degree of favorable therapeutic response was achieved and afterward maintained with a smaller daily dose than those with rheumatoid arthritis, mixed arthritis, and psoriasis with arthritis.

PATHOLOGY

Relationship Between Renal Function and Clinical Course in Chronic Renal Failure: Based on 29 Autopsied Cases. P. Effersøe. Acta med. scandinav. **156**:435-448 (No. 6) 1957 (In English) [Stockholm].

The relationship between the clinical course and the results of the endogenous 24-hour creatinine-clearance test, used as renal function test at a general hospital, was studied in 29 patients with chronic disease of the kidneys. The patients were selected on the basis of autopsy findings without regard to the results of renal function tests made while they were still alive. Patients with other diseases that might have influenced the chronic nephropathy, particularly those with cancer, were excluded. Of the 29 patients, 6 between the ages of 33 and 69 years had congenital cystic disease of the kidneys and 23 between the ages of 18 and 73 had kidneys of half the normal size as determined by autopsy. The 29 patients had been tested and treated at the hospital or had been followed up as outpatients for several years before their deaths. Patients with severe cardiovascular signs, such as pronounced cardiac edema, pulmonary edema, encephalopathy, or apoplexy, or patients with purulent urine had a serum concentration of creatinine at the time of their deaths that was much lower than that of the patients who did not present such cardiovascular signs or did not have pus in the urine at the time of their deaths. The serum concentration of creatinine also varied greatly in the patients with cardiovascular complications or pus in the urine. This finding suggests that the renal function has no direct influence on the fatal issue.

The patients without such cardiovascular signs and those who did not have pus in the urine showed only 1 common feature concerning the renal function in the course of their illness, namely a further impairment of the function from about 5% to about 4% of the normal as revealed by a rise in serum creatinine level from 9 to 13 mg. per 100 cc. to 14 to 16 mg. per 100 cc. within the period from 6 to 3 months before their deaths. The patients will survive for from 3 to 6 months after their impairment in renal function has taken place, no matter whether the impairment progresses still further after the 4% level has been reached. The patients whose renal function exceeds 5% of the normal as measured by the endogenous 24-hour creatinine clearance test (a serum creatinine level below 11 mg. per 100 cc.) can survive for several years, and the prognosis remains uncertain until the renal function drops below 5%. This applies to patients with cystic kidneys and chronic pyelonephritis. No correlation was found between the serum urea concentration at any time in the course of the disease and at the time of death.

Discrimination Between Obstructive and Hepatocellular Jaundice by Means of the Commonly Used Serum Tests. E. Hill and L. Zieve. Am. J. Clin. Path. **27**:6-12 (Jan.) 1957 [Baltimore].

The comparative effectiveness, separately and in combination, of 5 commonly used serum tests was evaluated in an unselected, consecutively observed group of 49 patients with obstructive jaundice who were paired individually, on the basis of the degree of bilirubinemia, with a group of 49 patients with hepatocellular jaundice. Nineteen additional patients were excluded from the study because 1 or more of the 5 hepatic tests to be evaluated were lacking. Carcinoma was the cause of obstruction in 28, stones in the common bile duct in 14, pancreatitis in 5, stricture of the common duct in 1, and the cause was unknown in 1 patient. Of the patients with hepatocellular jaundice, 24 had viral hepatitis and 25 had cirrhosis.

Tests used were those generally available in the ordinary clinical laboratory: cephalin-cholesterol flocculation, thymol turbidity, zinc sulfate turbidity, alkaline phosphatase expressed in King-Armstrong units, and the serum cholesterol level. Cephalin-cholesterol flocculation was by far the most discriminating test. The thymol turbidity test was 67% as effective, the alkaline phosphatase and zinc turbidity tests were 50% as effective, and the serum cholesterol level was 40% as effective. A combination of all 5 tests was only slightly better than the cephalin-cholesterol flocculation test alone. It is recommended that primary reliance be placed on the cephalin-cholesterol flocculation test and that corroborative information be sought with the alkaline phosphatase and thymol turbidity tests.

Changes in the Pituitary Gland in Massive Therapy with Steroids. T. R. Cox and W. Krohn. Am. J. Clin. Path. **27**:24-28 (Jan.) 1957 [Baltimore].

The recent innovation of treating leukemia with massive doses of steroids prompted the authors to study the pituitaries of such patients and compare them with those of patients who had received small maintenance doses of steroids. The 12 patients whose pituitaries were studied had received prednisolone, hydrocortisone, corticotropin, or cortisone in large daily doses. Prednisolone, for example, was given in daily doses up to 5 Gm. (usually 3 Gm.). Many of the patients had received total doses of over 27 Gm. The pituitaries were studied in routine hematoxylin-eosin preparations and by a modified periodic acid-Schiff, orange-G, aniline blue stain for pituitary granules. This stain clearly reveals the 4 types of pituitary cells: acidophilic, chromophobic, periodic acid–Schiff positive, and periodic acid–Schiff negative basophilic. All of the patients had had acute or chronic leukemia. Examination of the hematoxylin-eosin–stained slides proved surprisingly disappointing. Hydropic and hyalinizing changes were found in only a small number of the cases. Varying amounts of atrophy and apparent fibrosis, particularly in the region of basophilic cell localization, were rather constant features. It was not until the granule stains were studied that a pattern revealed itself. The cases were broken down into 3 groups on the basis of amount of periodic acid–Schiff activity because a striking variation in the number of positive cells was noted.

In the pituitaries of patients in group 1 who had received 27 Gm. of steroids or more a striking increase in periodic acid–Schiff activity and diminished numbers of basophils that are periodic acid-Schiff negative were consistent features. Studies now in progress show a moderate decrease in protein-bound iodine and decreased radioactive iodine uptake after massive steroid therapy. Inasmuch as these cells that are periodic acid–Schiff positive are believed to be responsible for thyrotropic hormone and their number is found to be increased in the absence of the gland, one might wonder whether these large doses had directly suppressed the thyroid gland, bringing about increased thyrotropic activity in the pituitary. Loss of the basophils that are periodic acid–Schiff negative, in some instances, seemed to be due to loss of specific granules from the cells and, in other instances, to an actual degenerative process. The changes in groups 2 and 3 corresponded closely to the ages of the patients and to gonadal function.

RADIOLOGY

Irradiation Therapy in Brain Tumors. W. Hellriegel. Strahlentherapie **102**:21-30 (No. 1) 1957 (In German) [Munich, Germany].

In a series of 248 brain tumors treated by irradiation pituitary adenomas accounted for 79, glioblastomas for 71, astrocytomas for 21, and medulloblastomas for 15. Spongioblastomas, oligodendrogliomas, ependynomas, neurinomas, meningiomas, angioblastomas, craniopharyngiomas, and others were represented in smaller numbers. In the treatment of brain tumors the radiologist must collaborate with the neurosurgeon, who plays the leading role. About half of the pituitary tumors could be improved by irradiation. With properly aimed irradiation, such as the convergence method, improvement can be achieved in 67% of the patients. In the other types of brain tumors the author prefers the pendulum or oscillating type of irradiation. The stationary-field type of irradiation is used only on patients with superficial tumors. Commenting on the interstitial implantation of radioactive isotopes, the author says that at his clinic grains of radioactive gold are implanted. Either the bed of the tumor is implanted with these radioactive grains during the operation, or the gold is implanted by the transcutaneous route after most of the tumor has been resected. A tumor dose of 6,000 r gives the best survival rates, this was especially evident in the 71 patients in whom irradiation was used for glioblastoma, 5 of whom survived for 5 years or longer.

Thorotrast Disease. L. Fruhling, C.-M. Gros, A. Batzenschlager and M. Dorner. Ann. méd. **57**:297-350 (July-Aug.) and **57**:409-486 (Sept.-Oct.) 1956 (In French) [Paris].

The excellent contrasts obtainable with Thorotrast (a colloidal suspension of thorium dioxide) caused it to be widely used in radiologic practice for some 10 years after its introduction about 1930. Reports of late complications, steadily increasing in number and severity, then began to appear and it soon became clear that the entire question of using Thorotrast would have to be reviewed in the light of these late effects. This the authors have attempted to do, devoting the 1st part of their study to a general consideration of the physical characteristics of Thorotrast, its history, its clinical use, and the experimental findings. Part 2 deals with the microscopic identification of Thorotrast and the histopathology of the late lesions, whatever their character or location. Part 3 is a report on the anatomic and clinical findings in 21 patients with late lesions due to the injection of Thorotrast, for which the authors use the general term Thorotrast disease.

Their findings make it clear that the introduction of Thorotrast into the body is constantly followed by late lesions, which may appear as (1) a local thorotrastoma causing only local symptoms, (2) a local thorotrastoma accompanied by clinical signs related to a generalized Thorotrast infiltration, (3) generalized Thorotrast infiltration with clinical manifestations but without a local thorotrastoma, (4) generalized Thorotrast infiltration discovered accidentally at autopsy, and (5) cancer associated with lesions due to Thorotrast. Thorotrastomas, which develop whenever a quantity of Thorotrast is injected into the connective or celluloadipose tissue either intentionally or by accident, are inflammatory pseudotumors. The injected Thorotrast, acting as a foreign body, is phagocytized by reticulum cells—histiocytes or macrophages. These cells eventually undergo necrosis, setting the grains of Thorotrast free to reexert their irritating action. The resulting sclerosis is intensified with each repetition of the process, and,

since virtually none of the Thorotrast is ever eliminated, the lesions progress slowly but inexorably.

Thorotrast, however, is not merely an inert foreign body; it is also a practically inexhaustible source of radioactivity—emitting alpha, beta, and gamma rays, and certain forms of cellular necrosis should undoubtedly be attributed to this fact. The severity of the late lesions due to Thorotrast is linked to the development of diffuse sclerosis of the liver resulting in irregular cirrhosis and severe degenerative changes in the liver structure. Involvement of the bone marrow is clearly evident on histological study; clinically, it is shown by moderate anemia, sometimes accompanied by platelet deficiency and mild leukopenia. The indications are that Thorotrast favors the appearance of cancer, especially endothelial sarcomas of the liver and the spleen. Cancers were found in association with thorotrastosis in 3 of the authors' patients. These findings show that the use of Thorotrast in human subjects should be absolutely forbidden.

Osteogenic Sarcoma of the Skull Following Irradiation. E. M. Skolnik, E. J. Fornatto and J. Heydemann. Ann. Otol. Rhin. & Laryng. **65**:915-936 (Dec.) 1956 [St. Louis].

The authors present the histories of 2 patients with osteogenic sarcoma of the skull. In the 1st patient, a 20-year-old man, the sarcoma developed in the temporal bone 3½ years after a postauricular keloid had been irradiated with a total of 6,050 r in air. The sarcoma was resected. In the 2nd patient, an 11-year-old girl, sarcoma developed in the frontal bone 10 years after the irradiation of a retinoblastoma (with radon seeds over a period of 9 months) and was inoperable. Eight similar cases reported in the literature are reviewed. The relatively young age of the patients, the minimum dosage of 3,000 r, the prolonged duration of irradiation treatment, and a latent interval of at least 3 years are important factors in the development of osteogenic sarcomas of the skull from this cause. These neoplasms are characterized by rapid growth. Malignant degeneration should be suspected if a localized swelling or mass develops in a region of previous irradiation, particularly if associated with skin alterations, pain, and functional disturbances.

Osteogenic sarcomas of the skull after irradiation have no specific radiologic feature. The main characteristics are the presence of a soft tissue mass, bone destruction with cortical involvement, periosteal reaction and eventually complicating fractures. Osteogenic sarcoma is a highly malignant neoplasm derived from cells analogous to osteoblasts. Its essential feature is the formation of osteoid tissue directly by the malignant osteoblasts with no intermediate fibrous or cartilaginous matrix. The presence of cartilage or giant cells does not exclude the diagnosis. No definite histological characteristic could be demonstrated in the osteogenic sarcomas of the skull after irradiation. Wide surgical resection appears to be the treatment of choice, but no definite conclusion is possible at present. Prolonged irradiation of benign lesions should be avoided.

PHYSIOLOGY

Investigations on Effect of Prethcamide (Micoren) on the Physiology of Respiration. A. Bühlmann and H. Behn. Schweiz. med. Wchnschr. **87**:135-137 (Feb. 9) 1957 (In German) [Basel, Switzerland].

The authors emphasize the need for effective analeptics in the treatment of intoxications in which respiration is impaired. They describe investigations on the new analeptic prethcamide (Micoren), a mixture of two alkylimino fatty acids, crotethamide and copropamide (see THE JOURNAL **155**:363 [May 22] 1954.) They tested its effect in 3 persons with practically normal arterial carbon dioxide tension, in 1 person with slightly increased tension, and in 11 patients with chronic respiratory acidosis resulting from obstructive emphysema in chronic asthmatic bronchitis or chronic bronchial asthma. In a 12th patient the chronic alveolar hypoventilation was a sequela of severe obesity. These 12 patients had a mild to moderate respiratory insufficiency with hypoxemia and hypercapnia. They were selected because the irritability or activity of their respiratory center was higher than normal and in the hope that prethcamide would help them. All subjects received by slow intravenous injection 3 cc. of a 15% solution (450 mg.) of prethcamide. With the aid of a self-retaining cannula, arterial blood was obtained anaerobically before and 5, 10, and 15 minutes after the injection. The blood was analyzed with regard to oxygen capacity, oxygen saturation, carbon dioxide content, and pH. The carbon dioxide tension was computed on the basis of the carbon dioxide content of the plasma and the pH. In order to obtain information about the respiratory mechanism and the ventilation, the esophageal pressure reading, the pneumotachogram, and the electroencephalogram were taken simultaneously with the withdrawal of the blood specimens.

Prethcamide produced a decisive increase in the total ventilation and a noticeable increase in the alveolar ventilation, with corresponding improvement in the arterial carbon dioxide tension. In the presence of pulmonary hypertension resulting from alveolar hypoventilation, a decrease in pressure, which corresponded to the improvement in the alveolar gas pressure resulted under the influence of prethcamide. Otherwise, however, the drug had no significant circulatory effect, at least not with the dosage and mode of administration used. Prethcamide had only slight secondary effects, but it was a very effective respiratory stimulant and analeptic. Its use is indicated particularly in patients with central respiratory disturbances such as in those resulting from poisoning with soporifics or morphine and in asphyxia of the new-born. A reduction in the arterial carbon dioxide tension can be achieved in chronic respiratory acidosis resulting from obstructive emphysema. Observations on the respiratory mechanism suggest that the drug is suitable for prolonged treatment only in combination with bronchiolytic drugs.

PUBLIC HEALTH

Effect of Food Preferences on Nutrient Intake. C. M. Young and T. D. Lafortune. J. Am. Dietet. A. 33:98-103 (Feb.) 1957 [Chicago].

Dislike for certain foods becomes important, if it seriously interferes with the adequacy of a person's intake of food. Such interference would occur only in those with many dislikes and particularly with dislike of certain key foods. Excessive food dislikes frequently are associated with neurotic tendencies or with immaturity. Women, particularly adolescent girls, are shown to have more food dislikes than men, and they are recognized to be 1 of the least well-fed groups in the population. A study of the relationship between food dislikes and other factors leading to food rejection was made in a group of Cornell University freshmen women. They were studied early in their freshman year while food preference still was under home influence; 145 were chosen at random and sent questionnaires. Ninety responded and 81 completed all the necessary entries. The ages of the girls were from 16 to 20, their heights from 60 to 70 in., and their weights from 100 to 169 lb. About 54 came from small communities, the others from large urban areas. The girls were asked to keep a record of all food and drink, except water, taken for 1 week. Time and place should also be listed. The menus served and the size of servings of the various foods were furnished by the dietitians.

Fifty-two of the 185 food items (28%) included in the check list were not disliked by any of the girls. Thirty-two of the 81 girls had dietary intakes below 70% of the recommended dietary allowances for 16-to-20-year-old girls in one or more nutrients. Calcium, iron, and thiamine appeared to be the area of greatest weakness in nutrient intake; 23 of the girls had calcium intakes below the 70% level; 21 had iron and 12 thiamine intakes below this level. In general, religious food restriction did not influence the adequacy of the diet. Health and caloric restrictions had an influence on 24 of the girls who were dieting to lose or gain weight. Milk, eggs, bread and cereals were not used in the available quantities, yet the girls did not list them as disliked foods. The authors' explanation for these less-than-desirable food intakes is the indifference of the girls to certain of the available foods. That eggs were an intensely disliked item on the check list is peculiar. It is clear, however, from the responses to the oral questioning, that the real cause is definite individual preference with regard to the preparation, not a dislike of eggs.

Food dislikes seemed to have little influence on the adequacy of the diet, because the most intensely disliked foods were listed among the "seldom-served" or "never-tasted" items. The solution of the less-than-desirable nutrient intakes at least in this group would seem to be an educational program aimed not at combating food dislikes but rather at emphasizing the importance of certain foods, which appear as optional items on the menu. This type of study should be extended to other population groups.

INDUSTRIAL MEDICINE

The Danger of Dermatoses Due to Cold-Setting Ethoxyline Resins (Epoxide Resins). E. Grandjean. Brit. J. Indust. Med. 14:1-4 (Jan.) 1957 [London].

The ethoxyline and epoxide resins are used as adhesives and casting resins in the manufacture of various kinds of apparatus, electrical equipment, automobiles, and aircraft. They are usually supplied in the form of 2 reactive components, resin and hardener. The introduction of ethoxyline resins (under the trademarks of "epon" or "araldite") into manufacturing plants where workers had been hitherto unfamiliar with chemical processes brought the workers into contact with substances that carried an unknown risk to the skin. The case histories and patch tests showed that the skin reactions follow contact with the liquid stage of the resin and hardener or with mixtures of these before setting is complete. This applies both to the apparent direct irritation and sensitization. A mean time of setting is about 48 hours, before which time contact with the material should be prevented. The set, hardened resin appears to be innocuous as far as skin reactions are concerned. The vapor pressures of the casting resin and of the hardener are so low that atmospheric concentrations are negligible in respect to the early and sensitization effects. While the direct contact of the liquid materials with the skin seems to be the chief problem, there is a possibility that even the low concentrations of resin or hardener vapors may be sufficient to induce a recurrence in a sensitized subject.

Workers should be trained by experienced men how to use these resins and should be told that traces of the casting resin on tables, chairs, shoes, clothes, machines, buttons, door handles, pencils, etc., may be the source of skin inflammations. The work bench should be covered by a strong paper on to which the casting resin may drip to prevent permanent contamination. The soiled paper could be removed twice daily and destroyed. Fresh cleaning rags should be supplied daily and used only for occasional cleansing of apparatus, machines, and containers. Contaminated rags should be handled with gloves. The use of solvents for removing spots of resin on the skin or nails should be abandoned. When apparatus is cleaned with solvents, the worker should wear gloves of polythene. Ketonic solvents are preferable. The well-known objection to gloves in work of this kind can to some extent be overcome by the use of soft leather gloves with knitted backs or, alternatively, thin cotton gloves under polythene. Barrier creams have their place in protecting the skin in this work, especially the face. It is desirable to install facilities for washing in the working room. Finger nails should be kept short and clean. After the day's work washing should be followed by inunction of the hands with a mild fatty ointment. Preemployment medical examination should eliminate persons with allergies from work in these processes. If the initial stage of skin irritation develops, an attempt can be made to prevent sensitization, but, if it does result, there must be no further work with the resin.

BOOK REVIEWS

Practical Diagnosis and Treatment of Liver Disease. By Carroll Moton Leevy, M.D., Director of Clinical Investigation, Director of Outpatient Department, and Attending Physician, Jersey City Medical Center, Jersey City, N. J. Foreword by Franklin M. Hanger, M.D., Professor of Medicine, College of Physicians and Surgeons, Columbia University, New York. Cloth. $8.50. Pp. 336, with 84 illustrations by Felix Traugott. Paul B. Hoeber, Inc. (medical book department of Harper & Brothers), 49 E. 33rd St., New York 16, 1957.

This is a practical and relatively condensed book on liver disease written for the clinician. A composite approach to diagnosis and treatment with correlation of clinical and laboratory findings is stressed. The first five chapters deal with the diagnostic significance of the various clinical and laboratory findings. Chapter 6 is concerned with general principles of therapy. Treatment of fluid retention, electrolyte disturbances, coma, and hematemesis is included. There is a brief discussion of the surgical procedures available for the latter. The tone of this chapter is practical, and there are convenient tables and diet lists. The final chapters deal with liver disease due to nutritional deficiencies and metabolic disturbances, toxipathic liver disease, circulatory disturbance, biliary obstruction and infection, neoplastic disease of the liver, and trauma. The presentation is clear, concise, and readable. The bibliography is selected but adequate for the purpose of the book. Theoretical discussion is minimal. The print is unusually clear, as are the diagrams and tables. The color plates are excellent. This book is recommended for the practitioner who needs a concise clear guide to the management of the more common problems encountered in patients with liver disease.

The American Academy of Orthopaedic Surgeons Instructional Course Lectures. Volume XIII. Editor: R. Beverly Raney, M.D. Cloth. $12. Pp. 327, with illustrations. J. W. Edwards, Ann Arbor, Mich., 1956.

The American Academy of Orthopaedic Surgeons, at its annual meetings during the past 15 years, has offered instructional course lectures that supplement the papers and discussions given in the scientific sessions. The subjects for these lectures are carefully chosen and include many of the fundamental concepts and basic techniques used in the practice of orthopedics. These are generally presented by authors who themselves have devised the techniques or have made special studies and contributions to the subject under discussion. Thus, at each meeting an opportunity is provided for each member or guest of the academy to select a group of lectures on subjects of interest to him or about which he wishes to refresh or supplement his knowledge. Through the years these lectures have been so popular that they have been published in book form. These annual volumes constitute a valuable reference library for practicing surgeons, residents, and students. Volume 13 contains 27 articles with appropriate illustrations. Among these are four on the hip, one on the spine, eight on neuromuscular diseases, three on diseases of bone, and three on traumatic lesions. In addition, there are articles on more general topics, such as anatomy and physiology of the bone and joints, bone tumors, vascular lesions, disability evaluation, medical writing, and medical education.

The Recurrent Laryngeal Nerves in Thyroid Surgery. By William H. Rustad, M.D., Assistant Clinical Professor of Surgery, University of California School of Medicine, San Francisco. Cloth. $4.50. Pp. 47, with illustrations by Ralph Sweet. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 24-25 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto, 2B, Canada, 1956.

This monograph is a study of the extralaryngeal portions of the recurrent laryngeal nerves on the right and left sides of the neck. Although 250 nerves were dissected in 125 cadavers, it was thought best to report on the 100 specimens that remained intact on complete exposure. Such painstaking dissection in an area where variations are the rule is commendable. Equally praiseworthy are the clear and accurate illustrations. Much worthwhile material has been presented. Of the 200 nerves dissected, 57% were found to be single trunk nerves while the rest were divided. Bilateral division occurred in 24% of the specimens. This nerve may branch at any point peripheral to its separation from the vagus nerve. The point at which this nerve is most vulnerable during a thyroidectomy is on the posterolateral surface of the thyroid gland at the level of the junction between the middle and lower thirds. Here the main branches of the inferior artery usually enter the gland. An interesting section on historical background and grouping of the patterns and a bibliography are included. This book can be highly recommended to surgeons and anatomists.

Morals in Medicine. By Thomas J. O'Donnell, S.J., Regent and Professor of Medical Ethics, Georgetown University School of Medicine, Georgetown University Hospital, Washington, D. C. Cloth. $3.75. Pp. 281. Newman Press, Westminster, Md., 1956.

The author correctly defines ethics as "an investigation into the goodness or evil of human actions in the light of natural reason." He has sought to extract from ethics, moral theology, and canon law the principles of each as he thinks they should apply to the actions of members of the medical profession. If the triad of disciplines on which this book rests is accepted by the reader as proper and germane, then there can be no disagreement with the author on the score of the treatment of the subject as he has outlined it. Very probably he is a skilled theologian and a man learned in canon law, but the application of principles of moral theology and canon law to ethical principles, as such principles apply to the practice of medicine, is a proposition that must be accepted or rejected by the individual physician, exactly as he must accept or reject the principles of deism in his own life.

These book reviews have been prepared by competent authorities but do not represent the opinions of any medical or other organization unless specifically so stated.

The eight chapters which comprise this book contain much that is both provocative and enlightening. In the third chapter, on the inviolability of human life, the definition of the fundamental equality of all men in the words "they all have the same final destiny or end in life, and are all equal in their intrinsic dignity as human beings" seems especially commendable. Such perplexing subjects as euthanasia, suicide, prolongation of life in the face of a terminal illness, mutilation, contraception, needless surgery, ghost surgery, prefrontal lobotomy, experimentation on human beings, professional secrecy, abortion, problems of marriage, and many others are treated in a resolute manner by the author according to the system mentioned. The book will be instructive to the physician who seeks a guide to his own professional conduct based on theology and morals as they affect ethics. The work does not inquire extensively into ethical problems encountered among physicians in their relations with one another, as opposed to ethical problems arising between physician and patient, but it was not intended as a commentary on the former category.

The Clinical Management of Varicose Veins. By David Woolfolk Barrow, M.D., Professor of Surgery, Marquette University School of Medicine, Milwaukee. With foreword by Arthur W. Allen, M.D. Second edition. Cloth. $6. Pp. 169, with 74 illustrations. Paul B. Hoeber, Inc. (medical book department of Harper & Brothers), 49 E. 33rd St., New York 16, 1957.

This is the second edition of a highly successful, concise, and clearly written monograph, eminently suitable for the general surgeon and also the general practitioner doing his own surgery. Perhaps the most attractive feature of the book is the detached, unbiased attitude of the author toward accomplishing the objectives of treatment. While he describes his own experience precisely, he calls attention to controversial points. The author's enthusiasm for femoral vein ligation for postphlebetic sequelae is not shared by this reviewer. The style is simple and direct, the illustrations are many, and the printing is excellent.

Clinical Physiology: The Functional Pathology of Disease. Edited by Arthur Grollman, M.D., Ph.D., F.A.C.P., Professor and Chairman of Department of Experimental Medicine, University of Texas Southwestern Medical School, Dallas. Cloth. $12.50. Pp. 854, with illustrations. Blakiston Division, McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 36; 95 Farringdon St., London, E. C. 4, England; 253 Spadina Rd., Toronto 4, Canada, 1957.

This book, the work of 26 contributors, attempts to present basic physiological principles in relationship to clinical medicine. In general this has been accomplished exceedingly well, largely because the editor has chosen clinicians whose research has been in the field of human physiology. Among these are the recent Nobel prize winners, Cournand and Richards, who have done a superb job with the section on the respiratory system. Chapters on carbohydrate, lipid, and protein metabolism were completed by Dr. John P. Peters just before his untimely death. The cardiovascular, digestive, endocrine, renal excretory, hematopoietic, and locomotor systems are all covered in this book. There is also a chapter on infection and immunity. References are given at the end of each chapter. A few diagrams and tables supplement the text in appropriate places. This is an excellent book for the internist and the hospital resident who would like to correlate physiological concepts with what is found in the diseased patient.

Radiology of the Alimentary Tract in Infancy. By Roy Astley, M.B., M.R.C.S., D.M.R., Radiologist, Children's Hospital, Birmingham, England. Cloth. $10. Pp. 287, with illustrations. Edward Arnold & Co., 41-43 Maddox St., London, W. 1, England; Williams & Wilkins Company, Mount Royal and Guilford Aves., Baltimore 2, 1956.

By combining roentgenograms, schematic drawings, and terse case summaries with observations and comments based on broad clinical experience, the author has realized his stated aim to produce a volume primarily for radiologist and radiologist trainee and useful to both pediatrician and pediatric surgeon. A great deal of highly pertinent material which deals with the radiologic aspects of gastrointestinal situations solely or primarily encountered in infancy is presented. This is arranged in seven anatomic subdivisions. Commendable brevity has been achieved, with no sacrifice of important content material and no compromise with clarity of discussion. The various developmental faults responsible for sometimes fatal and often obscure alimentary difficulties are particularly well presented and documented. By the avoidance of repetitive discourses on subjects that are not peculiar to infants, the pediatric keynote has been preserved throughout each subdivision. The outstanding excellence of literary content is matched by similar stellar performance by the publishers. Reproduced roentgenograms, always critically examined by radiologists, are of fine quality. This book merits attentive reading by radiologists and pediatricians and an honored place on the reference shelf.

The Gist of Obstetrics. By H. B. Atlee, M.D., F.R.C.S., F.I.C.S., Head of Department of Obstetrics and Gynecology, Dalhousie University, Halifax, N. S., Canada. Cloth. $6. Pp. 327, with 88 illustrations by Garth Vaughan, M.D., C.M. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, 24-25 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto 2B, Canada, 1957.

This book is based on lectures given by the author to his students. It therefore contains data based chiefly on his personal experience. It is not intended as a reference book in the manner of the larger standard textbooks on obstetrics. The author is partial to natural childbirth and is opposed to the widespread prophylactic use of forceps. He does, however, consider forceps on the after-coming head in breech deliveries the method of choice. In general, the advice given is in accord with that practiced in the United States and Canada. The illustrations are simple line drawings, but they are clear and instructive. There are no references, but this is because the book is a personal one. The author has a keen sense of humor which is evident throughout the book. This type of teaching is undoubtedly of great help to students; hence this book should be most valuable to medical students if used in conjunction with the standard textbooks of obstetrics.

QUERIES AND MINOR NOTES

PROPHYLAXIS OF AMEBIASIS

To the Editor:—*What is the value of the prophylactic treatment of amebiasis with antiamebic drugs? A number of persons return from Mexico with severe amebic dysentery in spite of hygienic precautions. This dysentery frequently proves refractory to treatment with all the modern amebicides. The statement has been made that prophylactic treatment with antiamebic drugs is not indicated because it may simply "mask" the infection or cause the amebas to become "drug-fast." What is the rationale of allowing individuals to acquire a full-blown or possibly a fulminating infection if prophylaxis is possible? Have any studies been made as to the value of chemical prophylaxis in amebiasis? Please outline in detail a suitable regimen for the prophylactic treatment of amebiasis. Which drug would be most effective? What would be the daily dosage, and for what period of time should the drug be taken? Would a combination of drugs, taken either simultaneously or in succession, be more effective?*

M.D., New York.

This inquiry has been referred to four consultants, whose respective replies follow.—Ed.

Answer.—Craig first suggested the use of amebicidal drugs prophylactically in the prevention of amebiasis (*Am. J. Trop. Med.* **20**:799, 1940). He proposed Diodoquin (5,7-diido-8-quinolinol) for this purpose and believed that, if administered in therapeutic amounts daily, the drug would probably destroy any amebas that might be ingested. However, this schedule was not supported by any clinical investigation.

Recently Beaver and others (*Am. J. Trop. Med.* **5**:1015, 1956) have demonstrated the chemoprophylactic properties of Diodoquin when administered to volunteers who were experimentally fed cysts of Endamoeba histolytica on several occasions at weekly intervals. They found that the daily administration of 650 mg. of Diodoquin, begun one week before the first feeding of cysts and continued for one week after the last feeding, completely protected all of nine volunteers against infection. Similar experiments with glycobiarsol (Milibis) demonstrated that this drug, in daily doses of 250 mg., protected 8 subjects against infection, although there was one apparent failure among 14 subjects in additional trials in which the number of cysts was twice that given the initial 8 subjects. It is probable that either drug would furnish effective suppression under circumstances that might provide casual or intermittent exposure to small numbers of cysts of E. histolytica. The drugs could be taken for a period of at least one month in the doses used in the above trials.

Answer.—There have been several demonstrations of so-called chemotherapeutic prophylaxis of amebiasis in mental institutions and one in a hyperendemic area in Central America. Mass treatment of groups having a high prevalence of infection has reduced prevalence practically to zero; the continuance of the chemotherapy for weeks or months has prevented reinfection from infected contacts. There are no known reports of studies of chemoprophylaxis in uninfected individuals going to hyperendemic areas. If chemoprophylaxis is desired, it can probably be accomplished by taking iodochlorhydroxyquin (Entero-Vioform), 0.25 Gm. twice daily, or Milibis, 0.5 Gm. three times daily twice a week, for the duration of exposure but not longer than a month. There is no advantage in taking a combination of drugs simultaneously, but they might be taken in succession. However, it is believed that it is preferable to avoid salads and unsafe water and to treat gastrointestinal symptoms as soon as they occur. Bacillary infections seem much commoner than amebic and can be quickly combatted by therapeutic doses of Entero-Vioform or a sulfonamide. There does not seem to be any evidence that E. histolytica becomes drug-fast, but it is recognized that some patients require a change of treatment in order to obtain a cure. Early cases of amebic dysentery rarely are refractory to chemotherapy with the modern amebicides. Persons with refractory cases should be examined carefully by an expert technician to determine whether there is some other etiological agent.

Answer.—In general, for prophylaxis, tourists or travelers take one Entero-Vioform tablet in the morning and one at night. This dosage schedule, in the great majority of instances, is adequate to prevent diarrhea and has the added advantage that the traveler need not carry pills around all day long. However, some travelers do take 1 tablet with each of the three daily meals. No sufficiently critical study has been done that could supply a definite dosage schedule. Dr. McPhee, from Princeton, had good luck with our athletes at the Pan-American games with 2 Entero-Vioform tablets daily.

If diarrhea develops, the dose should be increased in proportion to the severity of the diarrhea. Since Entero-Vioform is practically nontoxic, one does not have to worry about side-effects. From 4 to 6 tablets daily will usually clear up such nonspecific diarrhea in a matter of a day or two, and then, when the symptoms have disappeared, the prophylactic dose can be resumed. The use of Entero-Vioform has been mentioned by Hughes (*J. A. M. A.* **150**:1456-1459 [Dec. 13] 1952) and by Bercovitz (*Bull. New York Acad. Med.* **24**:51, 1948).

The answers here published have been prepared by competent authorities. They do not, however, represent the opinions of any medical or other organization unless specifically so stated in the reply. Anonymous communications and queries on postal cards cannot be answered. Every letter must contain the writer's name and address, but these will be omitted on request.

ANSWER.—Entero-Vioform is of special value in treatment of amebiasis and is believed by many laymen outside the United States to be of value also against the bacillary dysenteries. Therefore, on the basis of these assumptions, suppressive doses of 0.4 Gm. given orally twice daily might be effective in endemic areas. However, the usual precautions of avoiding contaminated food should be maintained. The sulfonamides have been recommended also, but, like the tetracyclines, their daily use by laymen, without medical supervision, may sensitize or cause untoward effects in a fair number of susceptible individuals.

ALCOHOLISM AS A MEDICAL ILLNESS

TO THE EDITOR:—*I have read much on the acceptance of alcoholism as a disease but have always felt that this is a moral or social problem rather than a medical one. I also feel that cirrhosis of the liver and psychosis would more likely have nutritional deficiency bases. Could you tell me what the grounds are for considering alcoholism as a medical illness?*

M.D., New York.

ANSWER.—A disease is defined as follows: In general, any deviation from a state of health; an illness or sickness; more specifically, a definite marked process having a characteristic train of symptoms. It may affect the whole body or any of its parts, and its etiology, pathology, and prognosis may be known or unknown.

A disease can also be classified according as to whether it is of primary or secondary origin. All patients suffering from the disease process known as alcoholism are also known as problem drinkers. The term "problem drinker" has more of a moral and social implication and exemplifies that type of reasoning. However, alcoholism does denote a condition in which there is a deviation from a state of health. Alcoholism can be classified into (1) primary alcoholism, which includes (*a*) those patients who from the very first drink of an alcoholic beverage are unable to control their desire for it and (*b*) those who through use over a great many years have developed an inability to take a drink or leave it alone and have become like group (*a*), and (2) secondary alcoholism, which includes those who use alcohol for its sedative action as a means of escape from reality and, in particular, from their personal problems, which are usually on a psychosomatic basis. This secondary group comprises by far the majority of patients suffering from alcoholism; however, most alcoholic patients prefer to be in the primary group.

Regardless of which group an individual belongs to when under the influence of alcohol, he is ill. The member of the primary group is not ill between episodes of drinking, but neither is an allergic person, unless exposed to the allergy. This does not necessarily imply that primary alcoholism is an allergy; it may be more akin to the excitement that certain drugs may produce (such as barbiturates and morphine) in some patients, since the action of alcohol is similar to sedatives and volatile anesthetics, such as ether.

However, the controversy as to whether alcoholism is or is not a disease is related to the voluntary aspects of the condition in a manner similar to narcotic addictions. Anyone can become addicted to narcotics or alcohol if he uses enough each day and for a long enough period. Both addictions are characterized by withdrawal symptoms, and the withdrawal symptoms can be prevented in both cases by substitute sedative therapy.

In chronic narcotic use, it has been shown (*Science* **124:**263 [Aug. 10] 1956) that continuous use of narcotic drugs inactivates the demethylating enzymes; although no similar mechanism has been shown for alcohol, some such altered physiological state might exist.

Simply because there is a moral and social aspect to this disease does not give physicians the right to deny its existence as a disease, any more than they would be able to deny the existence of venereal disease, which is usually quite obvious. As to whether alcoholism is a moral or social problem, rather than a medical one, all that can be said is that that is purely a matter of opinion and feeling, and undoubtedly both approaches are of value. The complications of alcoholism are undoubtedly nutritional, since the withdrawal syndrome (delirium tremens) can occur even if the diet and vitamin intake is more than adequate.

MUSCULAR DYSTROPHY AND HEREDITY

TO THE EDITOR:—*A 35-year-old man, height 5 ft. 10 in. (178 cm.), weight 115 lb. (52.1 kg.), has muscular dystrophy that began when he was 16 years old. The process started in his shoulder muscles and now involves almost the entire musculature of his body, except for the forearm muscles. He is still able to walk and works sitting at a bench. He suffers no pain in particular and seems to have a good attitude toward his disease. He has a daughter 10 years of age who at present has no signs of muscular dystrophy, but he is wondering whether she will be a victim of it, inasmuch as his mother, who is now bed-ridden, his uncle on his mother's side, and a brother, who is now confined to a wheel chair, all have muscular dystrophy. What can be done for him by a general practitioner?*

J. W. Wentz, M.D., Pataskala, Ohio.

ANSWER.—This patient undoubtedly has muscular dystrophy. On the basis of the fact, however, that onset was in adolescence and that many members of the family of both sexes are affected, as well as on the basis of the distribution of the atrophy, this would seem to be the type that first involves the limb girdles. The mode of inheritance of this type is not known quite as well as that of the pseudohypertrophic variety, which is a sex-linked recessive, and of the facioscapulohumeral type, which is usually dominant. Consequently, it is rather difficult to state whether the daughter will develop the difficulty or not, but, because of the high incidence in the family and the relatively late onset, there is certainly a possibility that she may. There are no suggestions regarding therapy other than general supportive measures and possibly physiotherapy to prevent the development of contractures. Mechanical aids should be used if indicated.

RECURRENT THROMBOPHLEBITIS

To the Editor:—*A 55-year-old man sustained a displaced fracture of both bones of the left forearm. On the day of injury, an open reduction and internal fixation with bone grafts obtained from the anterior iliac spine of the patient was performed. The arm was placed in a cast, and the patient did well for approximately 12 days postoperatively. He had been discharged from the hospital and was at home walking around when he was seized with a severe pain in the right side of his chest, accompanied by a slight elevation in temperature. He was admitted to the hospital, and x-rays were taken that revealed a wedged-shape infarct in the right lower lobe, which in the opinion of the consultants represented a probable pulmonary embolus. Dicumarol therapy was started, with complete relief of pain in the chest. At no time has the patient ever had any peripheral signs of thrombophlebitis, either in his legs or in his arms. He never complained of any calf pain, nor was there ever any calf tenderness. Dicumarol therapy was continued for 14 days, and two days after it was discontinued the prothrombin time had become elevated. The patient had another episode of pain in the left side of his chest, and again x-rays revealed a pulmonary infarct in the base of the left lower lobe. He was again treated with dicumarol, this time for a period of seven weeks, and again at no time was there ever any sign of peripheral thrombophlebitis. It was assumed that the patient had thrombophlebitis of the pelvic veins. The patient also never had any unusual pain or swelling in his left upper extremity, and, as a matter of fact, 12 weeks after the original operation, he has had union of the fractures and has complete motion in his forearm as regards supination and pronation. The question has arisen whether this patient will have any permanent disability as a result of the thrombophlebitis of the pelvic veins. How much disability is this man expected to have because of the thrombophlebitis, and what is the opinion as regards recurrence of the thrombophlebitis if he has another serious illness or major surgery?*

Robert T. Strang, M.D., Kingsport, Tenn.

This inquiry has been referred to two consultants, whose respective replies follow.—Ed.

Answer.—On the basis of what has been presented, the source of the pulmonary emboli is a matter of conjecture only. The emboli most likely arose from the veins in the affected arm. Since there is no good evidence that the patient ever had pelvic thrombophlebitis, it seems doubtful that he will ever have any permanent disability. Yet, if the patient ever undergoes a major operation or has a serious illness, the chances are good that he will be more susceptible to thromboembolic complications than one who has not had the episodes reported, and he should, therefore, be given anticoagulants, provided there is no contraindication to their use.

Answer.—The absence of signs of peripheral thrombophlebitis does not rule out the possibility that clots were present in the iliac veins. This could have been the source of the pulmonary emboli. There would have been more symptoms with a pelvic phlebitis than with a quiet type of iliac vein clot. If the pulmonary emboli are the result of bland clots in an iliac vein, then there will probably be no disability, since there are no symptoms to begin with in the extremities of this patient. Also, the entire clot may have traveled to the lungs. Although one cannot predict whether thrombophlebitis will or will not occur in an individual who has had one episode, should he have another serious illness or major surgery he would have to be watched closely, and, if there is a slight rise in temperature, he should be placed on anticoagulant therapy. In addition, during any such serious illness his legs should be elevated and exercised as often as possible to keep the blood moving. The legs should be examined daily during such a period.

GLYCOSURIA DURING FEBRILE ILLNESS

To the Editor:—*A 6-year-old girl, weight 50 lb. (22.7 kg.), had been having an intermittent fever, etiology unknown, for two weeks. One day after the fever disappeared, a urine specimen showed 2% sugar and was strongly positive for acetone. Three days later a glucose-tolerance test was reported as follows: fasting, 134; one-half hour after administration of 50 Gm. of glucose, 198; one hour later, 157; two hours, 128; and three hours, 138 mg. per 100 cc. All urine specimens were normal. All blood sugar tests were microscopic. Two years ago, during an upper respiratory infection, two urine specimens also showed a trace of sugar. The child is active and has developed normally in every respect. Should a diagnosis of diabetes be entertained here?*

Louis E. Itzkowitz, M.D., Brooklyn, N. Y.

This inquiry has been referred to two consultants, whose respective replies follow.—Ed.

Answer.—Transitory glycosuria occurs not infrequently among children during infections, and acetonuria likewise occurs frequently among normal (nondiabetic) children after fasting or inadequate food intake. In the absence of other symptoms it is unlikely that the child described has diabetes mellitus, but the possibility should indeed be borne in mind. In such a case it would be wise to have occasional tests of the urine for sugar after generous carbohydrate meals, especially during colds or other acute illness.

Answer.—The fact that the child had two urine specimens that showed a trace of sugar (or reducing substance) during an upper respiratory infection probably means nothing important, as many children have some reducing substance in their urine during acute febrile illness. The 2% sugar and strongly positive acetone found in the urine the day after the two weeks of fever is peculiar. The child may well have eaten poorly, and the acetone could easily be explained by loss of glycogen reserves caused by fever and poor appetite. A 2% sugar level, however, is difficult to explain, as this finding probably means that the child had as strong a sugar test as is possible to obtain by

qualitative methods, and she should not have had any sugar in her urine at this time. It is presumed that the glucose-tolerance test was an oral one and that the blood sugar tests were run by a method which measures total reducing substance rather than true blood sugar. The amount of glucose given is about 10 Gm. greater than is usually employed on children of this weight. The shape of the curve is, however, not abnormal, but the values are all high. If they are correct it is surprising that no sugar was found in the urine when the value reached 198 mg. per 100 cc. If the child has diabetes, it would be very strange that, three days after having much sugar and acetone in the urine, both should have disappeared and the shape of the tolerance curve should be normal rather than the prolonged high curve found in diabetes. While it is not thought that the child has diabetes, it is wondered if the blood sugar values are correct, and not all read higher than they really were. If there is diabetes in the child's family, it might be well to repeat the tolerance curve at a later date, perhaps using a different laboratory; otherwise, these peculiar laboratory findings can be disregarded.

HARMFUL EFFECTS OF DAILY ENEMA

To the Editor:—*Is there any possibility of harm from using the Fleet Enema daily? A patient began using it about two years ago and has found it indispensable.*

F. Paul Ansbro, M.D., Brooklyn, N. Y.

Answer.—There are no known clinical or experimental observations that would enable one to answer this question definitely. This consultant believes that no harm will result if the enema is used on a short-term basis, e. g., for several days; however, even under this condition there should be endoscopic control. Potential harm could result from long-term use because (1) it is unphysiological; (2) there could possibly be trauma to the anal canal incident to the daily insertion of the hard plastic tip (this consultant has observed such trauma a number of times after single insertions); (3) the passage of the excessive amounts of mucus produced by this concentrated salt solution might have an adverse psychological effect; and (4) frequent manipulation by the patient of the anal region, which is an erogenous zone, is inadvisable. Use of this concentrated salt enema should also be avoided by patients who require stringent salt restriction.

EFFECT OF RADIOACTIVE IODINE ON PARATHYROIDS

To the Editor:—*Can "atomic cocktail" therapy for hyperthyroidism affect the parathyroid glands in such a way as to cause hypoparathyroidism? This condition seems to have occurred in a patient who also has myxedema.*

J. K. Fancher, M.D., Atlanta, Ga.

This inquiry has been referred to two consultants, whose respective replies follow.—Ed.

Answer.—At a recent conference sponsored by the Atomic Energy Commission, the 10-year experience with radioactive iodine (I^{131}) therapy for hyperthyroidism and thyroid cancer was reviewed. A combined series of approximately 13,000 patients treated in a number of clinics was available for analysis. No instance of hypoparathyroidism was reported after treatment. Beta rays, released by disintegration of I^{131}, are absorbed within 2 to 3 mm. of tissue. Since these provide most of the radiation effect from I^{131}, it is theoretically unlikely that normal parathyroids would be exposed to serious injury. Injury would be hypothetically possible, however, if the parathyroids were anomalously placed and buried in hyperfunctioning thyroid parenchyma. Injury to normal parathyroids has not been reported after external radiation therapy, even with dosages directed against cancer in neighboring structures. However, Jacox has reported an increased sensitivity of hyperfunctioning parathyroids to the effect of radiation. It is thus conceivable that a patient with subclinical hyperparathyroidism, given radiation therapy for hyperthyroidism, might suffer parathyroid injury. The number of patients treated with I^{131} is now sizable, so that, according to the laws of chance, spontaneous idiopathic hypoparathyroidism might be expected to occur in a few patients receiving I^{131} therapy.

Answer.—Large numbers of patients have now received I^{131} in therapeutic doses, many of them very large doses designed to destroy the thyroid gland or to treat cancer of the thyroid; but up to the present there is only one known report in the literature of temporary parathyroid insufficiency following I^{131} therapy (Tighe: *J. Clin. Endocrinol.* **12**:1220, 1952). A well-documented case should be considered for reporting in the literature.

CAFFEINE AND ULCERS

To the Editor:—*The 1955 edition of Goodman and Gilman's "Pharmacological Basis of Therapeutics" (ed. 2, New York, the Macmillan Company) indicates that caffeine, even more than alcohol, in its stimulation of gastric acid production, distinguishes between ulcer victims and normal persons. The stimulation of the stomach by alcohol is a direct effect and does not depend on the mediation of the nervous system. What is supposed to be the mechanism of the stimulation by caffeine? Since, according to Goodman and Gilman, amphetamine does not stimulate production of gastric acid, presumably nervous connections, if involved, do not depend on stimulation of the cerebral cortex. Is an intact vagus nerve necessary for the stimulation by caffeine? Will parasympathetic inhibitors, such as atropine or Banthine, destroy the effect of caffeine? Patients taking Banthine, for instance, often ask if they may be permitted alcohol or coffee.*

Alfred B. Mason, M.D., Concord, Calif.

Answer.—The exact mechanism of stimulation by caffeine of gastric acid secretion is unknown. It does not result from a central nervous stimulant effect of caffeine, and the vagus nerve need not be intact; whether intramural ganglions are necessary has not been determined. Available evidence suggests that caffeine directly stimulates the parietal cells. It also

enhances the gastric secretory response to alcohol, histamine, acetylcholine and its congeners, meat extractives, and electrical stimulation of the vagus. The enhancement of the vagal effect is most likely explained by the fact that acetylcholine is released peripherally when the vagus is stimulated. Parasympathetic blocking agents, such as atropine and synthetic substitutes for atropine, moderately reduce but do not abolish the stimulation by caffeine of gastric acid secretion. This is also true for the stimulation by alcohol and histamine.

LIPOTROPIC DRUGS

To the Editor:—*A number of medical products for use in geriatric practice contain inositol, choline, and methionine. Has the therapeutic value of these substances been established?* *M.D., Florida.*

Answer.—Inositol, choline, and methionine were introduced and used for the purpose of reducing heightened blood cholesterol levels. They have some effect but little therapeutic value, and their use has markedly decreased. A panel of nutritionists and clinical and laboratory specialists, at a recent meeting of the American Geriatrics Society, were unanimous in the opinion that these drugs give no service in prevention or therapy.

Answer.—Although a relatively large number of published experimental and clinical studies have hinted at the possibility of modifying arteriosclerotic changes in humans by the administration of lipotropic agents and other drugs, there seems to be no conclusive evidence establishing the therapeutic value of these preparations for this purpose. The report of Moses (*J. A. M. A.* **156**:492-493 [Oct. 2] 1954) points out that there is no acceptable evidence in either man or animals that atherosclerotic lesions can be retarded or reversed by the administration of either one or several lipotropic agents in combination, and there is considerable evidence that the administration of large amounts of these dietary supplements to patients with moderate degrees of hepatic damage may be detrimental. A reply to a query in The Journal for Feb. 12, 1955, page 625, expresses the opinion that, despite some reports, the evidence of a definitely favorable effect of lipotropic agents in retarding the progression of atherosclerosis is inconclusive.

POTENCY OF ASCORBIC ACID AFTER STORAGE

To the Editor:—*If orange or grapefruit juice is strained from the natural fruit and placed in a pitcher or glass, will it keep for a period of from one to three days in the refrigerator without any decrease in the content or potency of ascorbic acid (vitamin C)?*

Harris P. Dawson, M.D., Montgomery, Ala.

Answer.—The amount of ascorbic acid lost from fresh orange juice that is stored for 24 hours in a covered glass or china container in a refrigerator is negligible. Moore and associates, cited by Sweetman and MacKellar in "Food Selection and Preparation" (ed. 4, New York, John Wiley & Sons, Inc., 1954), reported in 1945 that, even when orange juice is kept uncovered in a refrigerator for as long as a week or at room temperature for three days, there is little change in the ascorbic acid content; however, there is better flavor when the juice is covered and stored in a refrigerator for no more than three days.

WESTERGREN SEDIMENTATION RATE TECHNIQUE

To the Editor:—*I am writing in reference to the query and minor note in* The Journal *of Dec. 29, 1956, page 1674, regarding the Westergren sedimentation rate technique. We use the Westergren method as regular office procedure on our patients and have been using a different normal range. The consultant states that the normal for men is 1 to 3 mm. and for women, 4 to 7 mm.*

We are using a Westergren pipette, 300 mm. long, 2.5 mm. in diameter, graduated in millimeters up to 200 mm. We use a 3.8% solution of sodium citrate. This apparatus is made by Clay-Adams and the normal with this method is 0 to 15 mm. for men and 0 to 20 mm. for women after one hour. I have checked other laboratory sources and find this to be the most frequently used normal standard for the Westergren method.

*I noticed the reference to Ham and Curtis (*Medicine **17**:447, 1938*) as the source of reference. I would appreciate the explanation of the great difference in normal standards recommended.*

Arthur W. Greenfield, M.D.
50 Anderson St.
Hackensack, N. J.

The above comment was referred to the consultant who answered the original query, and his reply follows.—Ed.

To the Editor:—*It is agreed that a Westergren pipette is 300 mm. long, 2.5 mm. in internal diameter, and that when the blood is drawn up to a 200 mm. mark it contains about 1 ml. of blood. The anticoagulant is an aqueous solution of 3.8 gm. of sodium citrate per 100 ml. This is used in a preparation of 0.2 ml. of anticoagulant for every 0.8 ml. of whole blood, making a final concentration of 760 mg. of sodium citrate per 100 ml. and a dilution of 20% of the blood with an aqueous solution.*

Westergren, himself, gives the normal range of it to be 1 to 3 mm. sedimentation for men and 4 to 7 mm. sedimentation in one hour for women. Other values that are higher are probably not normal and may be contributed to by anemia per se.

VITAMIN K ADMINISTRATION

To the Editor:—*The reply to the query on vitamin K administration, which appeared in* The Journal, *Jan. 26, 1957, page 327, is somewhat misleading. It is stated that "vitamin K$_1$ appears to have some superiority over synthetic vitamin K preparations in the treatment of idiopathic hypoprothrombinemia." If the idiopathic type is considered the same as the congenital and hereditary types, that statement is*

erroneous, since neither the natural nor the synthetic vitamin K corrects the deficiency of this type of prothrombin activity. In vitamin K deficiency such as occurs in the newborn infant or in the patient with obstructive jaundice both types of vitamin K are effective, but in the latter condition the synthetic water-soluble vitamin K has the advantage that it can be absorbed from the intestines in the absence of bile. Excess amounts of vitamin K can depress the prothrombin time, particulaly in the presence of liver disease (Richards and Shapiro: J. Pharmacol. & Exper. Therap. *84:93, 1945).*

Armand J. Quick, M.D.
Department of Biochemistry
Marquette University School Medicine
Milwaukee 3.

The above comment was referred to the consultant who answered the original query, and his reply follows.—ED.

TO THE EDITOR:—*In regard to the literature reference cited, while the citation is essentially correct from the contents of the paper, it may be worth while to quote the following from the authors' conclusions to this paper: "In man doses approximately ten times as great as those generally recommended for therapeutic use, given daily for a period of one week, induce no significant changes in the blood. In normal subjects large doses of Hykinone can produce temporary hyperprothrombinemia; in cases of liver disease similar amounts of menadione bisulfite extend the prothrombin time."*

RECURRENT FACIAL SEBACEOUS CYSTS

TO THE EDITOR:—*In the March 23, 1957, issue of* THE JOURNAL, *page 1095, under Queries and Minor Notes, there are discussed various surgical approaches for the treatment of recurrent facial sebaceous cysts. May I offer a simple, but apparently not too widely known, procedure which I use in my dermatological practice for the removal of either sebaceous or epidermal inclusion cysts? The cosmetic result is much better than with scalpel excision and sutures, and the end-result is more complete and dependable than with incision.*

The skin over the center of the cyst is anesthetized with Novocain injection. With a 4-mm.-diameter biopsy punch, a circular piece of skin, including the external portion of the sac wall, is removed. Through the remaining hole the sac contents are expressed, and the sac is delivered in toto *with a hemostat. Pressure is applied for a minute or two to minimize bleeding, after which the plug of skin, with the sac portion cut away (to prevent future recurrence). is replaced into the hole. A dressing is applied and left in place for several days until the graft of replaced skin "takes." In this manner the sac is removed, no skin is lost, and no sutures are required.*

A modification for the removal of scalp cysts consists in not replacing the skin plug but placing just one suture to prevent bleeding, since pressure dressings are difficult to apply on the scalp. This method also eliminates the necessity of shaving the scalp, except for clipping a few hairs in the tiny operative field. I have removed cysts on the scalp the size of an egg by this simple and short procedure.

William M. George, M.D.
Walnut Creek, Calif.

The above comment was referred to the consultant who answered the original query, and his reply follows.—ED.

TO THE EDITOR:—*There are actually hundreds of methods of removing sebaceous cysts. The answer to the original inquiry made no attempt to describe all of them. The method presented in the above comment is another good conservative measure for use on the face. However, a tiny incision, such as mentioned in the original answer, leaves less scar than a sutured or grafted punch.*

DRUGS INTERFERING WITH PROTEIN-BOUND IODINE DETERMINATION

TO THE EDITOR:—*In a query and minor note published in the Dec. 22, 1956, issue of* THE JOURNAL, *page 1582, a physician requested a list of drugs capable of causing a distorted blood protein-bound iodine level. I noticed that desiccated thyroid, thyroglobulin, thyroxin, and sodium liothyronine (*L*-triiodothyronine, Cytomel) were omitted from this list. Of course, it is known that desiccated thyroid, thyroglobulin, and* L*-thyroxin will increase the blood protein-bound iodine levels. In contrast, sodium liothyronine will not increase these levels (I have seen no increase in protein-bound iodine values in patients receiving as much as 150 mcg. per day). On the other hand, administration of sodium liothyronine may cause a decrease in blood protein-bound iodine values, while the patient remains clinically euthyroid. Because of the rapid cut-off of effects after withdrawal of sodium liothyronine, protein-bound iodine values generally return to pretreatment levels within a few weeks.*

Martin C. Sampson, M.D.
418 S. 47th St.
Philadelphia.

The above comment was referred to the consultant who answered the original query, and his reply follows.—ED.

TO THE EDITOR:—*The original reply to the query and minor note in question was restricted to a consideration of iodine-containing drugs creating spuriously high protein-bound iodine levels. The above comment draws attention to another way in which the levels may be effected. The failure of sodium liothyronine to elevate protein-bound iodine levels is considered to be due to its rapid escape into the tissues, while the fall in the protein-bound iodine level that is often noted with its use is due to depression of endogenous thyroxin formation.*